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The officers and representatives of the Soft-Lite Lens Company, Inc. join in wishing all their friends a joyful holiday season and continued happiness and prosperity in the coming year.

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AMERICAN JOURNAL OF OPTOMETRY

Vol. 12 DECEMBER, 1935 No. 12

CONTENTS

ORIGINAL PAPERS
The Oblique Muscles in Ocular Rotation and Astigmatism. G. L. DuPlessis 459
The Lag in Dynamic Retinoscopy. L. A. Swann 465
Accommodative Insufficiency in Glaucoma and General Disease. J. O. Baxter, Sr. 468
A Basic Technique in Orthoptics. Part IV. William Smith 473

EDITORIALS
Health Service in Soviet Russia 481

BOOK NOTICES
Physiological Optics. Second Edition. W. D. Zoethout 487
Scientific Basis for the Selection of Bifocals. Albert L. Anderson 488

ANNUAL INDEX—1935 . . . . . 489 to 499

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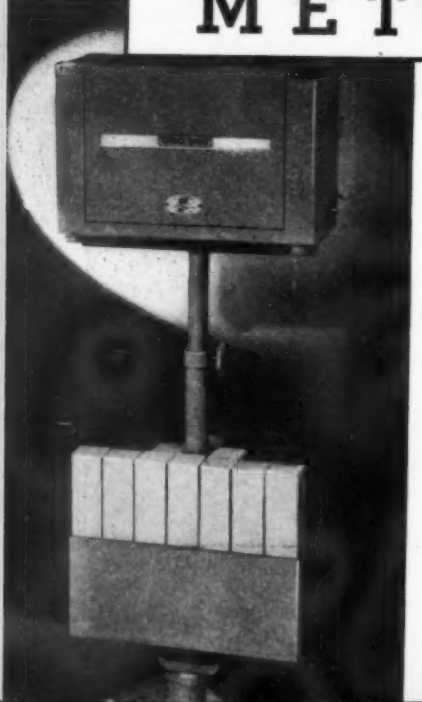

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AMERICAN JOURNAL OF OPTOMETRY

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THE OBLIQUE MUSCLES IN OCULAR ROTATION AND ASTIGMATISM*

Guy L. Du Plessis, O.D.
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Today's refractive technic may be said to be deficient in two respects:

1. The oblique muscles are ignored in their relation to other perioocular muscles.

2. The effect of astigmatic corrections on the oblique muscles are also ignored.

Result: Failure to obtain relief in certain astigmatic cases. Lenses may improve vision, but are unsupportable.

The oblique muscles are two in number: The Superior, innervated by the 4th or Trochlear nerve; the Inferior, controlled by the 3rd or Oculomotor nerve.

In conjunction with the obliques, it is necessary to point that the plane of action or rotation of the vertical recti, does not lie parallel to the optic axis, but forms an angle of about 30° with that axis. Result: Only when one eye is pointing outward or temporally 30° is the action of its vertical recti purely up and down. In the primary position the action of the vertical recti, both controlled by the third nerve, is not only to turn the eye up and down, but also to pull it in, thus assisting the internus.

We can only speculate on the extent of this assistance, but that there is some cannot be denied and can be proven. The relief of a hyperphoria by prisms may decrease an esophoria and thus show that relaxation of the vertical recti alone may induce a reduction in the esophoria. Due to their angular attachment, the vertical recti may also induce a rotating movement of the eye about its fore and aft axis and thus assist or supplement the obliques.

This rotation, whether caused by the obliques, vertical recti or both, should generally be called "torsion." They are rotating ductions referred to in the same sense as lateral ductions. When referred to in the sense of a phoria, it should be called declination (after Stevens) because the term

*An abridgment of an illustrated lecture given before the Minnesota Academy of Optometry at Minneapolis, September 22, 1935.

cyclophoria is confusing and implies an innervational defect, whereas a declination may be a visual process needed to satisfy optical laws, or may be physiological.

The purpose of torsional rotations is to keep the principal retinal meridians parallel when the eyes are in the primary position (looking straight ahead). In the primary position, the principal retinal meridians may be deviated from the parallel either by astigmatism, or by the correction of this astigmatism with lenses, if the eyes had been in the habit of aligning the principal meridians when the eyes were uncorrected.

Principal retinal meridians must be parallel in the primary position to satisfy the law of corresponding retinal points. Any deviation from parallelism in that position produces diplopia. To avoid diplopia the obliques and the vertical recti will be brought into play, and tort the eyes in such a manner that the principal spatial meridians, tilted by astigmatism or lenses before impinging on the retina, will fall on corresponding retinal points. The torting of the eyes may cause some apparent distortion, but the image will be seen single. This new position of the eyes may be painful, hence a new complaint from the patient.

What causes this tilting of principal meridians?

We know that all transparent curved surfaces have refractive properties as produced by a number of prisms, that in spherical bodies we have a point image because the prismatic effect is equal in all directions, and that in cylindrical bodies, the effect being unequal, we have a line image.

The refractive media of the eye are similar to lenses and if the cornea is astigmatic obliquely, the principal spatial meridians will appear on the retina tilted toward the eye meridian of greatest curvature, exactly as a vertical line seen through an oblique cylinder is tilted toward the plus axis of that cylinder.

We may formulate without mathematical proof that:

1. The tilting of the principal meridians in an astigmatic eye is toward the meridian of greatest curvature, this being where the axis is indicated if a plus cylinder and opposite if a minus cylinder is used.

2. The tilting of the spatial line image seen through an oblique cylinder is toward the axis if a plus, away from the axis if a minus.

3. The tilting is proportionate to the curvature and reaches its maximum when the axis of error or of cylinder is at 45° or 135°.

4. The tilting produced by an oblique cylinder is proportionate to the effectivity of the lens.

Just as in lateral phorias, the lateral recti perform ductions to adjust the visual axi and prevent diplopia, so do the obliques perform ductions to overcome the tilting of principal meridians by one cause or another.

These oblique ductions should be called voluntary torsions. Torsions may be voluntary as in the process of overcoming a prism, or they may be automatically produced as in vergence. The limits of voluntary torsions are according to Stevens:

1. By the superior oblique, tilting the top of vertical meridian inward,

Binocularly	18 to 20°
Monocularly	9 or 10°

2. By the inferior oblique, tilting top of vertical meridians outward,

Binocularly	22°
Monocularly	12 to 14°

By mono and binocularly are meant respectively, testing one eye at a time by rotating one target, or by turning both targets, thus distributing the load over both eyes.

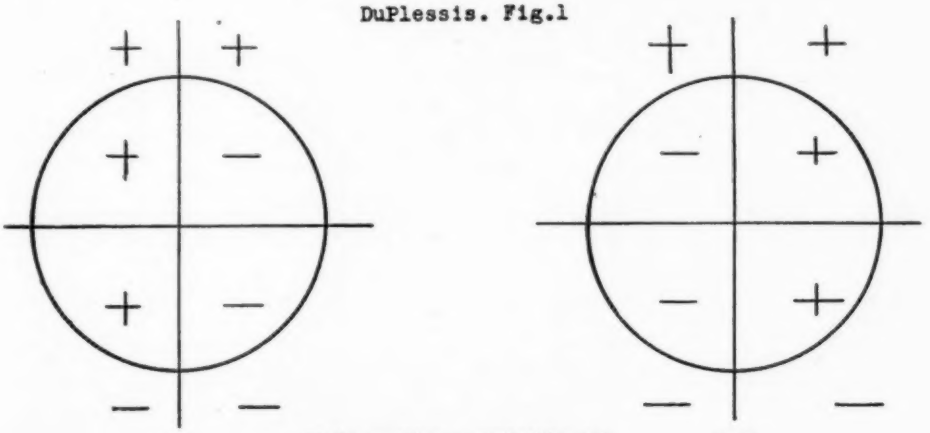
Declinations and torsions are called negative when the top of the vertical meridians converge at the top as performed by the superior oblique. They are called positive when the vertical meridian is made to diverge at the top, by the action of the inferior oblique.

The voluntary torsions referred to above are not true torsions. They are used only to compensate for defects of declinations generally caused by astigmatism.

However, when the line of regard is displaced from the primary position to any other position not on the principal meridians, for a given altitude and lateral location of regard, there exists a fixed torsion automatically produced by the obliques. The reader is referred to the March, 1933 issue of the American Journal of Optometry, under title "The Horoptor" for a simplified explanation of that subject and self-evident proof that any new oblique position of regard does not lie on the primary isogonal circle and that to obey Listing's Law a torting movement of the eye is necessary.

The illustration (see cut) defines this fixed relationship:

DuPlessis. Fig.1



Note:- Signs outside of circle denote ascension. Signs inside circle demote lateral position.

When the ascensional sign and the later sign are of the same kind (+ and +, — and —) the torsion is positive. When the ascensional and lateral signs are unlike (+ and —) the torsion is negative.

It is thereby easy to determine the direction of torsion by referring to the illustration.

If the eyes look up and to the right the signs will be alike in the right and unlike in the left eye, therefore the top of the vertical meridians will be tilted outward in the right eye and inward in the left eye.

When the eyes are lowered as in reading, the signs are alike in both eyes and a positive torsion is produced; whereas when reading above the horizontal plain the torsion is negative, through action of the superior oblique.

These torsions are true torsions, physiologic and necessary for binocular single vision.

Oblique astigmatism may make abnormal demands on one of the obliques and make these adjustments difficult or impossible. If the adjustment is impossible, we have a case of diplopia and squint not predicated by the hyperopic correction. Therefore our statement that a certain case of squint of low hyperopia is caused by too tight a "hook-up" between accommodation and convergence may be entirely false, and we cannot expect success in these cases without a consideration of the oblique error usually present.

Also, an astigmatism at axis 120° in the right eye may cause that eye to tort in the direction of 90° to overcome the tilting of the spatial meridians, and force the patient to adopt a laterally inclined posture, especially in reading, thus promoting a hyperphoria and esophoria out of proportion to the error.

We well know that lateral phorias are seldom proportional to the error. If they were we could use them as a guide to determine the percentage of error acceptable for best vision and maximum comfort.

We attempt to make a hyperope orthophoric without allowing for esophorias incited by oblique muscle action. The result is often an overcorrection too great for comfort. In the case of astigmatism at 120° referred to above, the superior oblique will pull the 120° meridian toward 90°. This will cause by reason of attachment of the superior oblique, the eye to turn down and out. The superior rectus and the internal rectus act to neutralize the hypo-exophoria. The synergistic action of the internal rectus of the other eye may induce a marked esophoria, when the natural tendency is exophoria.

If the astigmatic correction is such as to cause greater stimulus of the superior oblique, the end result is a greater esophoria whereas the spherical element may have only a limited effect on the original phoria.

An appropriate question is: How often are such cases met with in routine refraction? The paucity of data makes it impossible to state accurately. However, one hundred cases were taken at random from case records, eliminating possible cases of astigmatism not corrected in the

final prescription. The final correction was taken as criterion of the error because some compromise has to be made in conflicting findings, and because the final correction being tolerated must be a fair resume of the fundamental error.

These one hundred cases were then tabulated as follows:

1. Astigmatism with the rule at 90 or 180°.
2. Astigmatism against the rule at 90 or 180°.

Included in both classes were those cases of spherical error in one eye, astigmatic at principal meridians in the other. The results, out of one hundred cases, were:

1. 28
2. 20

Total for error at principal meridians 48 cases.

It is not to be inferred that these cases comprise 48% of astigmatic errors. The frequency found in these cases will vary according to the refractionist even if averaged in thousands of cases depending on his particular technic of examination and prescription.

A common delusion among refractionists is when in doubt place the axis in the principal meridian. The writer feels singularly free from this "Gordion Knot" method of solving the problem and tries to avoid any arbitrary positioning of cylinder axis. Unfortunately with our inadequate instrumentation, it is sometimes necessary to resort to this method. Forty-eight per cent is probably too high a figure.

The remaining 52 cases were divided as follows:

3. Symmetrical axis. Example: 135-45°.
4. Assymetrical axii in symmetrical quadrants. 50-120°.
5. Sphere in one eye, oblique in the other, other than 135-45°.
6. Assymetrical axii in assymetrical quadrants. 50-55°.

Before grouping these corrections were transposed in plus cylinder form.

Results

3. 10 cases
4. 14 cases
5. 25 cases
6. 3 cases

The last three classes are most apt to cause declinations, either in the error or in its correction. They total 42% of astigmatic cases or thereabout. If the oblique muscles are a notable consideration in 42% of astigmatic cases, they are important enough to be made a routine consideration in all cases of astigmatism.

It is difficult in a short article to show how these declinations are produced by astigmatism and its correction. However, we may state a few axioms.

Astigmatic errors at oblique axis cause distortion in the form of rotation of spatial meridians toward the meridian of greatest ocular curvature.

Cylindrical lenses produce distortion in the direction of the axis if plus, opposite axis if minus lenses are used.

The law of corresponding points must be obeyed in avoidance of diplopia. Astigmatic errors, producing dissimilar images will produce diplopia unless some adjustment takes place to compensate for this dissimilarity. The result is binocular vision with more or less spatial metamorphopsia eventually re-interpreted by the brain. Any change in the status-quo either by lenses or otherwise, means a readjustment and a new interpretation.

It should be our work to foresee this new position to facilitate acceptance of glasses and when possible eliminate the subjective distortion.

Insufficiency of the inferior obliques is comparatively rare, therefore astigmats with the meridians of greatest curvature diverging above become accustomed more quickly to the correction than those with meridians of greatest curvature converging above. The reason is that when meridians diverge above, the load has been on the superior obliques and these more willingly give up their load than the inferior obliques.

To conclude we can repeat Steele's rule in want of a better method of handling oblique astigmatic cases:

When plus cylinder axii are more than 45° from the vertical, turn them toward the vertical: when less than 45° from the vertical, turn them away from the vertical. The opposite is true for minus cylinders.

A little reflection will show the reader that the tendency has been to do the opposite: When in doubt set at 90 or 180°. We had better remain in doubt than set the axis wrong.

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THE LAG IN DYNAMIC RETINOSCOPY*

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If a non-presbyopic emmetropic subject is examined with the dynamic retinoscope, a plus-shadow is found, and if the test is taken to reversal the lenses accepted to effect neutral are about plus 1.25 to plus 1.50. This phenomenon, termed the lag, is well known to optometrists, but the reason for it has been debated for years. In previous papers I have suggested that the lag was due to the fact that a 100% acuity (or a 5-minute angle) was not demanded at the reading distance in daily life, consequently a full accommodative effort is not put forth. If we take a reduced Snellen chart for use at 33 cms. and compare it with an ordinary newspaper, a novel, and a sample of typewriting, it is evident that the smallest types in these examples of reading matter are larger than the 100% type (last line) of the reduced test type. Therefore there is no reason why the eyes should put forth a full accommodative effort when reading a newspaper. In fact, accommodation must be variable, for type varies in size from the main title down to that used in the personal column. I would suggest that the change in dioptric power when the eyes fix the 13-inch point is only about 1.75 to 2.00 D. and not 3.00 D. as has been accepted since the time of *Donders*. Therefore when a pair of eyes fix the skiametric fixation target, only an habitual accommodative effort is put forth and a lag of plus 1.25 or thereabouts is found.

If accommodation is only 2 D. (taking this as an average), then what is happening to convergence? For the visual axes must meet, otherwise diplopia will occur. In normal eyes one metre-angle or physiologic exophoria exists. Why does it exist and why physiologic? We accept it because we find it, but does it not show that the remaining two metre-angles are linked up with the 2.0 D. of accommodation habitually used? Look at it this way: the eyes accommodate 2.0 D. and put forth two metre-angles of convergence in doing so. This is not enough, for three metre-angles are required to bring the visual axes together at the 13-inch point, so the remaining metre-angle is made up by fusional convergence, and under dissociation reveals six prism dioptres of physiologic exophoria; hence the new lag theory explains the reason for physiologic exophoria.

*Submitted for publication Nov. 1, 1935.

Let us take the discussion further. When presbyopia approaches, exophoria decreases, and according to my investigations the lag also decreases. From this it is reasonable to assume that ciliary innervation increases in early presbyopia because the crystallines are hardening and require greater ciliary effort to effect the dioptric change for near vision. This also increases convergence and the physiologic exophoria decreases. It is quite easy to picture the condition when 3.0 D. of ciliary innervation is needed to cause a crystalline change of 2.0 D.; this in its turn will produce three metre-angles of convergence and reduce the physiologic exophoria. A reading addition restores normality and the exophoria is reproduced. From this we can also see that in the non-presbyope the absence of a lag shows that convergence insufficiency exists, for the extra innervation to the internal recti causes greater ciliary effort which reduces the lag. Base-in prisms reproduce the lag and therefore the dynamic retinoscope enables us to detect convergence insufficiency even when dissociation tests show apparently normality. When no lag exists in non-presbyopes, the base-out blur in the adduction test at 33 cms. is low—an expected result in such cases.

The lag of accommodation in non-presbyopes is, as already stated, the outcome of the habitual accommodative effort in daily life, for the size of reading matter permits the accommodation to be lazy. But when presbyopia approaches the lag disappears, for the crystalline hardening demands more innervation, the lazy habit can no longer be tolerated, the habit changes and greater innervation is put forward. This change of habit *changes gradually* and for a time is not noticed, for a patient in the early stages of presbyopia does not visit the optical practitioner until close vision becomes really difficult.

It is noticeable that after some presbyopes (of the age of 50 years or thereabouts) have received a reading addition acceptable on the usual types, a small lag of plus 0.25 to plus 0.75 exists, while in others the full skiametric result is accepted. I am inclined to think that those who have a small lag have less crystalline senility than those who have no lag. All optometrists have occasional presbyopes who return complaining that their corrections are too strong, in spite of the fact that the optometric tests appeared most satisfactory. I believe that in these cases the crystalline lenses are sclerosed to a lesser degree and that where a lag shows up skiametrically after a satisfactory addition has been decided upon subjectively, the addition should be reduced 0.25 D., for the presbyopia is not so senile or advanced as those who show no lag. From this it will be deduced that I work out the presbyopic addition subjectively and apply skiametry after, for I believe the method of giving a presbyope a test type in the hand produces the best results, for it is better psychologically and the refinements of the addition can be worked out afterwards on the phoroptor and with dynamic retinoscopy.

In myopia a lag of plus 1.75 to plus 2.0 is invariably found, for if convex lenses are put up in front of a myopic correction the accommodation relaxes to that amount which is habitual, namely, about 2.0 D.

Consequently I consider a lag of 2.0 D. in non-presbyopic myopes to be normal.

If in non-presbyopes a high exophoria exists with low lag and low adduction blur-out, orthoptics are indicated providing there is no toxaemia; but if the lag and adduction blur-out test is normal, the exophoria is the exhaustion variety and only refractive measures are required.

To summarize: Up to 30 years of age a lag of plus 1.50 is normal, higher indicates accommodative weakness or latent Hy. When less than plus 1.50, convergence insufficiency exists varying according to the amount of lag.

From 30 to 40 years of age the lag decreased gradually from plus 1.25 D. to plus 0.75 D.

All myopes up to this age have a lag of plus 1.75 to plus 2.0 D., and this exists in spite of the fact that esophoria invariably exists at the reading point, and it is the lag which proves that this esophoria is pseudo and due to convergence habit.

From 40 to 50 years of age the lag indicates accommodative weakness and some of it requires correcting. By working subjectively and objectively the degree of senility can be ascertained.

After 50 years of age the presbyopia is invariably essential and the whole of the dynamic result is usually accepted. When the lag is not totally accepted I term the presbyopia "non-essential," and prefer to give a little reduction on the reading addition for crystalline senility is not so advanced.

Finally, dynamic retinoscopy discloses that an amblyopic eye, whether ex-anopsic or pathologic, has a higher lag than its normal fellow. This may be due to the fact that accommodation is actually weaker or that the decrease acuity of vision prevents the eye from making the accommodative effort habitually put out by its fellow eye. I am convinced that this observation shows that the accommodative function atrophies to some extent when acuity is reduced.

The variability of accommodation apparently explains why the act of convergence is supplied through the two sources, first through the act of accommodation and second through the act of fusion. As a subject reads print of various visual angles, a continual adjustment between accommodative and fusional convergence must exist. If the accommodation is of a fixed amount there is no reason why the convergence should not be wholly accommodational as it was originally considered to be.

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ACCOMMODATIVE INSUFFICIENCY IN GLAUCOMA AND GENERAL DISEASE*

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Glaucoma is not a rare disease. It constitutes about one per cent of all cases of eye disease.[1] In the experience of the writer it is almost habitually overlooked by both Optometrist and Oculist especially in the incipient stages of the disease. It is frequently mistreated in the congestive and acute types with great damage to vision.

It is not always an easy matter to recognize early and border line cases even by experienced pathologists. The ophthalmoscope may not reveal the classic text book picture of a cupped disk and increased tension, et cetera, in this stage, and this is the time for the most successful treatment of the disease.

We should have every symptom of glaucoma engraven upon our memory. All low amplitude of accommodation cases and high presbyopic adds should be looked upon with suspicion and before such findings are prescribed, the very likely possibilities of glaucoma or toxicity should be fully investigated.

Using the Graduate Clinic Foundations data, all high 5-6-14a-14b-21 and low 19-20, with low 19 as the key symptom as well as the usual low duction typing as given in this technic, most frequently has a decided toxic background and a possibility of a grave disease or glaucoma back of such accommodative disturbances.

Therefore, a lower No. 19 finding than the patient's age would indicate, is a key symptom we believe, of either toxemia or glaucoma, or perhaps both, and particularly so if the chain is completed with low ductions. The above chain, if the patient is toxic or in a run down condition, is not complete in glaucoma in our belief unless this disease is the result of a debilitating or toxic disease.

It is well known that accommodation is frequently impaired in toxemia and various diseases emanating from toxins both endogenous and exogenous. Such impairment may be partial or complete (paresis or paralysis) or we may find the spastic or irritative type known as spasm of accommodation, all of which are bound to be reflected into the various

*Submitted for publication September 3, 1935.

refractive findings. We may thus find a partial or complete involvement of the motor oculi with accommodation alone impaired with convergence intact or vice versa, or the pupil impaired with or without accommodation or convergence involved. Convergence alone may be effected by over or under stimulation, et cetera.

Accommodative insufficiency should be expected in several major and minor diseases, infections, and causes as well as in glaucoma. "Ill sustained accommodation" as Fuchs describes it[2] should be typed as an eye disease or as a symptom of general disease until it is proven to the contrary.

A few of the causes of accommodative insufficiency or loss are toxic conditions due to infection, such as intestinal putrifaction, tuberculosis, influenza, measles, whooping cough, tooth and tonsilar infection, nasal obstruction, disorders of internal secretion, metabolic disorders (diabetes, etc.), neurasthenia and anemia brought on by overwork, impaired nutrition, high blood pressure, medicinal agents taken orally, accidentally or instilled into the eye in diluted forms (belladonna, etc.).

Impairment of accommodation as well as the more severe forms of its loss is found in brain disease, syphilis, diphtheria, and ptomaine poisoning. One of the most dependable and constant symptoms of glaucoma in all its types is the impairment of accommodation which results from the internal pressure on the ciliary nerves and muscles. The pupil may be enlarged, sluggish in its reactions, oval in shape, with its long axis vertical. Convergence may not be involved except in general disease or disturbances from which it may result.

Of exceedingly great value is the impairment of accommodation in the early and prodromal stages of glaucoma. It may be found long before any other symptom of the disease is noticed. Starling states that accommodative loss is frequently one of the first symptoms.[3] The disease may remain in this stage for some time, ready at any time to break forth into the destruction of both vision and the eye. Few practitioners of any cult recognize glaucoma in this stage unless they have this engraved upon their memory—*Insufficiency of accommodation is an almost constant symptom of glaucoma.*

Optometry may greatly extend its service to humanity if it will be on the outlook for this important symptom which will almost invariably be demonstrated in the eighteen or twenty-one point examination as outlined by The Graduate Clinic Foundation.

If we will have our forms printed with a "G" in front of nineteen as a key symptom, if low, in order to keep glaucoma in mind, it will be quite difficult for a careful optometrist to overlook the disease. The glaucomatous chain will be complete with high 5-6-14a-14b-21 and low 20. In the event that there is no other symptom of glaucoma the case should be kept under supervision until this disease is eliminated, especially in patients of middle and old age.

When there is found a diminution of accommodation as demonstrated in the above chain (all of which should be placed in the pathological chain until disapproved), we should then begin a systematic search for glaucoma or toxemia, remembering that in the early glaucomatous stages there may not be found any other symptom at this time, and that a rapid increase of presbyopia (*particularly when marked in one eye more than in the other*) should always excite suspicion of glaucoma.[4] In the prodromal stage tension may repeatedly be found normal, and there may not be any external or ophthalmoscopic evidence of the disease.[5]

The next step is the examination of the pupil and we may also say that in those of middle or later age particularly that a dilated, sluggish pupil should also excite suspicion of glaucoma. Next notice the cornea; if it appears steamy as if it had been breathed upon and not clear, or if it is insensitive to the light touch of a sterile spud, you then have another symptom of glaucoma. Next notice the iris; if it is pushed forward, thus forming a shallow anterior chamber, you have another symptom. In the congestive types the iris is dull and its outline may not be clearly defined.

Next notice the periphery of the cornea; if blood vessels are prominent in this location and gradually fade out into the conjunctiva, you then have a limbus congestion and another symptom of the disease. In acute cases the whole of the conjunctiva is intensely red and may protrude over the edges of the cornea (chemosis) and the lids are swollen and edematous.

I wish to call attention to the fact that we are not making any attempt to classify the various types of glaucoma. The main idea is to set forth a systematic procedure in its diagnosis, particularly in the early or prodromal stages.

We now proceed with the ophthalmoscopic examination of the optic disk; if it is cupped to its very edge, partially or fully with its blood vessels bending under the excavation and hiding there to again appear in the bottom of the cup, then the diagnosis is fully established. The depth of the cup is accurately measured by the number of diopters difference between the lens value that will focus the vessels at the edge and bottom (3D. equals 1 mm.) of the disk. Beginners should remember that a cupped disk that does not extend to the edge of the disk is not necessarily a glaucomatous cup.

Glaucoma is essentially a disease depending upon an increased intraocular pressure in which the rate of inflow and outflow of the fluids within the eye is disturbed. In every case the outflow of fluids from the eye is not equal to the inflow, therefore the tension builds up. This is the cardinal symptom and the most important one upon which hangs the long trail of subsequent morbidity of the disease. Inasmuch as there is little or no increase of tension found at the time it is taken in some types of glaucoma, it is obvious that a method other than finger palpation is needful.

An increase of tension or pressure within the eye results in a mechanical disturbance of the blood flow therein, there is difficulty of the inflow of arterial blood and at the same time the outflow of veinous blood is inhibited. The results are shown in a decrease of the size of the arteries and an increase in the size of the veins. The latter become full and tortuous and more liable to rupture with hemorrhages.

There is often pulsation of both arteries and veins at the disk, if not, it is easily elicited by slight pressure upon the globe of the eye. Arterial pulsation is always pathological and an important symptom of glaucoma. It is also seen in heart disease. Pulsation of the veins is of little or no importance.

If there is a lack of fresh arterial blood within the eye, nutritional disturbances may arise and affect the lens which may undergo degenerative changes leading to cataract. Therefore, cataractuous lens should be investigated with a suspicion of glaucoma as the cause.

Patients with incipient glaucoma may consult the optometrist complaining of the usual asthenopia such as headaches, lacrymation, photophobia, inability to use the eyes for near work without discomfort, and of having to hold the near work a little further away than has been customary, etc. All innocent looking symptoms as anyone will readily agree, but, what a frightful calamity for the patient and doctor who may waste a lot of time in such cases experimenting with glasses, orthoptics or what not in ignorance of the cause of these symptoms if the cause is, as it may be, glaucomatous.

Again, "The most usual early symptom of glaucoma is a frequent desire to change the reading glasses, periods of obscuration of vision and haloes around lights."[6] Occasionally night vision is impaired due to a disturbance of the light sense. It is a well known fact that the light sense is markedly impaired in glaucoma and patients are unduly sensitive to diminished illumination in the ordinary sense of the word. "The subjects of simple glaucoma in its earliest stages, or even when in anticipation in normal vision, if tested with photometric types will almost always show a decided lessening of the acuity of sight."[7]

Changes in curvature of the cornea which produce astigmatism against the rule are of great significance in chronic glaucoma and may precede its development.[8] We here see the need of ophthalmometric data and the preservation of such records.

Peremetric and stereo-campimetric data is of great value in the early diagnosis of glaucoma, and in following the prognosis of the disease. The first early change seen with the campimeter is an enlargement of the blind spot at either the upper or lower quadrant which forms a narrow sickle shaped scotoma or blind area extending towards the fixation point. The early change found with the perimeter is a contraction of the nasal field.

In the event that the above mentioned scotoma or nasal contraction is arrested there is little chance of any further progress of the disease.

Therefore, the record of the visual fields is of great value in the prognosis of glaucoma. In the event of further enlargement of the scotoma, or contraction of the nasal field, then other measures are in order.

On general principles, accommodative loss in glaucoma does not involve convergence. But inasmuch as glaucoma is a symptomatic disease with a pathologic background of many disturbances and diseases all over the body, all of which cause glaucoma, we may then expect such upsets as lower the tonicity of the body as a whole, and a lowering of most all ductions as well as accommodation and convergence. In that all low ocular reserves may be a reflection of the same condition throughout the body with almost any kind of a disease back of the condition, then certainly when found they should be typed as such until disproved, and the proper technic employed to discover the cause most certainly will extend the sphere of the optometrist and his usefulness to humanity.

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A BASIC TECHNIQUE IN ORTHOPTICS*

Part IV.

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Four interesting cases have recently come to my notice. These cases have never received orthoptic training, and only one hasn't been given permanent optical correction. Their variation, I feel, would be of interest to the orthoptist, as would also be the methods employed for their training. None of these cases are fully corrected orthoptically. As a matter of fact, one is to be started on orthoptic training during the Christmas vacation period, and one has been started on October 15, 1935.

Miss B. W., age 29, stenographer, has left Hyper-Esotropia with amblyopia-ex-anopsia. The esotropia is periodic and is entirely unnoticeable with the correction. The Hypertropia is apparent at all times. Both are noticeable when the glasses are off. Corrected vision with the prescription:

O.D. + 0.50 D.Sph.⌒+1.25 D.Cyl. Axis 65. V.A.=20/20.
O.S. + 1.50 D.Sph.⌒+1.75 D.Cyl. Axis 105. V.A.=20/200+.

Pinhole vision in left eye is 20/100. There is suppression.

Both eyes are negative insofar as pathology is concerned. The media are clear and the fields are normal. A diagnosis of Left Hyper-Esotropia with Amblyopia-ex-Anopsia was made and a system of orthoptic training was advised. This was in August, 1935.

A program was laid out for the handling of this case. Training had to be directed for the development of the visual acuity; the hypertropia and the esotropia. Suppression had to be broken up and fusion developed. After this is accomplished, the finer elements of vision will be developed. This regimen is necessary, if permanent effect of the training is to be had.

In treating this case, two phases of it were undertaken at the same time. Visual acuity was the first concern. Correction of the vertical tropia was the second.

In the course of the preliminary examination I noticed that there was marked suppression of vision with the left eye. That eye behaved as if it didn't exist entirely, insofar as vision was concerned. Alternate

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monocular fixation together with binocular fixation, both on dissimilar target cards and on the retinal stimulator were given. The method employed in giving this exercise with the retinal stimulator is quite simple. The stimulator is in front of the amblyopic eye. A card with a picture or letters on it is placed in front of the other eye and is either illuminated, or left dark. As the stimulator flashes on and off, the patient perceives the bulb of the stimulator with the amblyopic eye and the picture with the other one. After a while projection and the sense of binocular perception becomes apparent and accurate, and vision simultaneously with both eyes becomes a matter of habit. As this phenomenon of vision was becoming established, correction of the vertical tropia, the second step in the routine was started.

The methods employed in the training of the vertical muscles present nothing new or unique. My first object was to develop the ducting power of the affected muscles, without regard for the development of the fusion faculty. I am using two similar type pictures in the instrument, or two pencils, placed horizontally on the instrument table. The pictures or the pencils are lined up in the horizontal plane. I call attention to the lining up of the objects rather than to their content and I find there is greater ducting effort exerted there than if fusion training were also included. After the vertical muscles are developed to normal, visual acuity is further developed and the horizontal muscles trained both for duction and for fusion. After these are normalized, the higher elements of binocular single vision are trained and developed.

Mr. S. G., age 27, has periodic left divergent strabismus. Visual acuity, uncorrected, is 20/20 in each eye—slightly better in the right. Fundi, media and external eyes are negative. The visual fields are also normal. Optical correction is not indicated, although he takes:

O.D. + 0.25. D.Cyl. Axis 90.
O.S. + 0.50. D.Cyl. Axis 90.

with the same visual acuity resulting. He has left suppression, no fusion and no stereopsis. To establish my diagnosis, I questioned the young man concerning the past history of his eyes and have learned that he has had this difficulty since early childhood. He has had several eye examinations, but no glasses or other form of advice was ever given him.

The fact that there is excellent visual acuity, indicates that the condition must have been an alternating exotropia which became monolateral. The amount of deviation is about 20° at maximum. It varies with the intensity of fixation.

A program was mapped out for this case in which consideration was given to all the symptoms. My first concern was to establish macular fixation and projection. This will be taken care of in the home training and at the office, with the stimulator and hand and eye coordination. Simultaneous binocular fixation, using the method outlined in the first case, will be employed in this case also. In addition, fixation, using dissimilar targets in front of each eye, will be given. This will help to establish

simultaneous binocular perception and to break up suppression. When macular perception, projection and binocular vision is established, duction training will be started. At present his easiest point of diplopia is 30△Base-In prism. Prism Base-In training will be given and the amount reduced until he is able to overcome Base-Out prism duction power. Exercises to break up the suppression in the left eye will be given at this time.

With the duction power of the interni strengthened, fusion training will be started. This will be given him in easy stages but intensely. As in the duction training, fusion will be trained commencing with Base-In prism effect, gradually reduced to produce Base-Out effect. This procedure may be necessary in order to create a desire for fusion. Incidentally, giving Base-In and Base-Out prism training, tends to increase the fusion amplitude.

In the course of duction and fusion training, versions and rotations will be given with and without the aid of prisms. There seems to be a variance of opinion on the efficacy of motility in orthoptic training. In my practice I am using motion in the form of versions and rotations, with specially provided cards and manually, using a colored pencil as the fixation target. Prisms Base-In or Base-Out are supplemented, at times. The power of the prisms vary from 15△ O.U., 30△ O.U. to 45△ and 60△. All rotation and version is done at the near point, usually between 13 to 20 inches, and the movement is directed in the horizontal, vertical oblique and rotary meridians, both clock and anti-clockwise. The length of time varies with the case. This training is given in all advanced cases, as a matter of routine. I am not ready to take a definite stand on the issue and I do not believe that this part of orthoptic training is of such vital importance as some would have us believe. The trained gymnast doesn't twirl and contort his muscles in every conceivable manner and promiscuity. His method of physical development is scientific and is seldom vigorous to a point of exhaustion. Duction training, and with it, fusion development, are in combination physio-psychological methods and educative processes and should be approached as such, with that in mind. Indian clubs may be excellent in the development of the arm and back muscles, but they would hardly do in the development and training of the internal recti or the inferior or superior recti muscles.

The final act in orthoptic training is in the development of stereopsis. This phenomenon is the highest attainment of the visual faculty and is dependent on fusion and all its attributes. When fusion is definitely established, the training of stereopsis is a simple matter and the mental response is usually easy. With the faculty of stereopsis established, the orthoptic case has reached its maximum point of development and becomes fixed. The processes of visual rehabilitation becomes a permanent attainment and there is a remote possibility of slipping back to the old habits of suppression, heterotropia and amblyopia.

Mr. I. M., 18 years old, a student of pharmacy, is working in a drug store after school hours. He has 20/20 vision with each eye, but the

eyes are painful and very tired after doing any amount of near work. He was examined four years ago and was prescribed O.U. + 0.37 D.Sph.⌒2△ prism, Base-In. This made no change in his visual acuity, but there was some relief from the tiredness and pain. The condition complained of returned recently, and it interferred with his school work. His visual acuity is the same as was formerly. The fundi, pupillary reactions, external eyes and media are normal. Ophthalmometrically, skiametrically and subjectively he shows no indication of astigmatism, and after doing all the routine tests, I could prescribe nothing better than +0.37 Sphere O.U. combined with 4△ Base-In prisms O.U. He has 8½° of Exophoria at distance and 25° Exophoria at the near point. No indication of a vertical imbalance either at distance or at near. His fusion was fair and so was the stereopsis. There was no evidence of suspension or suppression. His ductions at the far point were abnormal in the horizontal plane: 12° Abduction and 12° Adduction. He has 4° Superduction and 4° Infraduction. At near he has Positive Fusion Reserve 12/9; and Negative Fusion Reserve 16/12. I measured the breaking point and the recovery. The case was diagnosed as Insufficiency of Convergence (Divergence Excess) and orthoptic training advised, to be started at once. The boy is in such a position at present that he can't find the time for this training, as he is at the pharmacy school and is working after school hours, until very late at night. His work is continuous and mostly at the near point.

In order to give the desired relief, I ordered the prescription made up and instructed the patient to wear the glasses constantly until the time that he is to come for the training. In searching for the possible cause for the condition, I question Mr. I. M. and his father at length. It appears that the eyes have been "weak" since the boy was about seven or eight years old. But at that time the doctor consulted didn't advise glasses. When the boy was seven years old he undertook to break himself of left handedness and he had succeeded in training his right hand to do all the work his left hand can do. Now he is ambidextrous. He expressed an opinion that it may be since that time that he is having difficulty with his eyes. The fact that he has unimpaired fusion faculty and stereopsis strongly points to this as the plausible cause. It may be that had this change of hand taken place before his fusion faculty has reached its maximum development, there would have been a strabismus instead of an Heterophoria.

In the newer conception of binocular muscle action and with the added knowledge of the physiology of the fusion faculty, better understanding and more lucid interpretation can be given to the phenomena and reactions, both normal and abnormal. We have better understanding of the so-called "referred and reflex irritations" and we are able to ascribe to the reactions in the eyes and in the muscular apparatus which they are frequently producing. This information has helped to clarify conditions which were misunderstood in the past and has given a new meaning and a scientific aspect to the science of orthoptics. If greater success is

now obtainable from orthoptic training, it is due largely to new concept which the ocular muscle physiology has received.

That emotions cause physical disturbances which are known as neurosis, has been known for some time. That these same emotions may produce visual disturbances and particularly visual hysteria and muscular anomalies is now being recognized. Frequently conditions of marked severity may be caused as a result of emotional neurosis. Anxiety, worry, fear, apprehension, over-fatigue and sexual disturbances are but few of the causative factors.

In the examination of a potential orthoptic case, cognizance must be made of the possible existence of these emotional factors. No program should be undertaken without the assurance from the patient that all effort will be made to eliminate them.

I mention these facts because I realize their vital importance in connection with this work. For an orthoptic case to be successfully concluded, every outside hindrance, every devitalizing force must be removed. It seems that the abnormal eye is readily susceptible to adverse influences, be they mental, physical or psychic.

Miss I. G., 16 years old, was operated on for convergent strabismus in the left eye, at the age of eight. The surgeon who performed the operation discovered upon exposing the eye, that external rectus was congenitally absent and he improvised that muscle from Tennon's capsule. As a result, the operation was highly successful. Both eyes are orthophoric. Vision in that eye, at the time of the operation was approximately 20/200—. As time went on, vision became lowered because of non-use and suppression. A few months ago the girl reported at the clinic with the complaint that vision in the left eye was lost entirely and that the other eye had been aching and feeling strained.

An examination revealed loss of light perception and projection in the left eye, and as would be expected, there was no sense of motion apparent. The right eye had 20/20 vision. The fundi, pupillary reactions to light and accommodation and the refractive media appeared normal. As a result of these disclosures, a diagnosis of amaurosis could not be made. It appeared to be a case of visual hysteria and the case was diagnosed as such.

Questioning the patient we discovered the possible cause for the hysteria. The girl had been working under great mental strain. There was a great deal of difficulty in the family and in addition, she had been reading a lot and had been studying very hard. The diagnosis of "Visual Hysteria due to Anxiety Neurosis" was tentatively made and the girl referred to the orthoptic clinic for training.

In view of the existing condition, it was of no value to prepare a program in this case. Our first concern was to establish visual perception, even of the remotest kind. Hence, training was started for that purpose. To determine our diagnosis, we placed plain colored cards, red, green, yellow, white and black in the Telebinocular and set the holder at 0:1

meter, 20, and 13 inches. The cards were moved along the card holder at the four varying distances in front of the left eye. The right eye piece of the instrument was packed with cotton gauze and a blinder placed in front of the lens to prevent that eye from seeing. At 13 inches, the girl reported that she got a semblence of motility when the red and yellow cards were moved. We checked this again and again and with the same results. The retinal stimulator was then set up in front of the left eye piece of the telebinocular, the right remaining occluded as before. The girl was not told of what to expect. When the light flashed on, she jerked her head away. She got the sensation of light.

Treatment was directed along the same line and the same procedure as that used in the test was employed at first and is being carried out at present. The girl is able to recognize colors and can make out large letters at the 0 position on the telebinocular. It is a long and tedious procedure, but we hope to realize results to more than repay our efforts. Visual hysterias are not uncommon occurances, but the severity of the case cited makes it unusual.

With the clinical procedure outlined, it is essential to consider the underlying causes in many cases. In the case of visual hysteria attention had to be given to the cause which hastened the onset of the condition. In this case the etiology was mental anxiety and strain. In order to get proper reaction to our training regimen, a program for mental hygiene had to be provided. Every consideration was given to the patient's home life, environment, schooling, recreation—in short every phase of her daily life was taken into consideration in formulating advice. The same consideration must be shown to all problem cases. It is well to bear in mind that Heterophorias and Heterotropias are all abnormal manifestations and are, therefore, problem cases.

It has been my practice when a new orthoptic case is taken on. to make certain of three conditions with the patients or with their parents or guardians. One, is the length of time the case may require. I usually specify, unequivocally, that the time may be from six months to a year, or longer. The patient is required to come at least three times a week to the office, and at the very start is given home work, which he is asked to bring with him at each visit. As the case progresses, the patient is given home training equipment with instructions on how to use it. He is given these instructions with actual demonstrations at the office, thus making certain that there will be no blundering. Home training is the second condition. The third one is concerning fees and "guarantees" of results.

No honest doctor will guarantee cure or treatment. This distinction belongs to the quack. The optometric specialist, and especially the one doing orthoptic work, in his capacity of an honest and ethical practitioner, is in no position to give definite assurance that a case will work out satisfactorily. He can promise most assuredly that he will do his utmost to bring about amelioration, but no more. Yet, in spite of this, he must secure a fee of sufficient proportion to make the efforts worth

his while and to make it appear a service worthy of a specialist. The fee is generally figured on the man's ability and reputation; the patient's ability to pay and on the length of time figured the case may take. Definite arrangements must be made as to the amount of the payments, how they will be made and when. Experience has taught me to figure a lump sum for a specific case and to make arrangements for weekly or monthly payments, the former preferably. Payments of five dollars a week, is the minimum advised. Lower weekly fees will only tend to cheapen the service. It is worth remembering that people still value quality, and that quality is usually expensive.

I have digressed from the main topic for the benefit of the few orthoptists who are interested in the economic aspect of orthoptics. Basically, it is an important part of the service. While it is uppermost in our minds to help our patients and to correct their anomalies, it must also be borne in mind that the orthoptist has problems of economic nature which he is obligated to meet. Hence the digression.

When the squinting eye has learned to straighten and is beginning to see singly, first by superpositioning one picture over the other and then by actual fusion, that is the time for greatest care and vigilance on the part of the orthoptist. At this stage some patients may report of pain in the muscles of the eye exercised. Some patients may report that they had a strange sensation of the strabismic eye suddenly becoming straight and remaining so for a long period. It is my method to try to create diplopia in the course of training. This I do in order to establish binocular fixation, even if it is not co-ordinate. I instruct my patient not to ignore the second image, but to encourage its appearance. I tell them that this is a sign that both eyes are seeing and that suppression no longer exists. After the squinting eye begins to straighten and can fuse at its proper prismatic base effect, the patient may see singly when the two eyes are straight and double when one deviates. In giving exercise at this stage, care must be exerted to have the two images fall on exact and corresponding spots in the two retinae. This, to be sure, is essential throughout the entire period of training, but it is doubly so important at this period. When superposition first makes itself apparent, the patient may report that the two pictures appear as if they were "a double exposure." This is a valuable sign and should serve as check that fusion is somewhat difficult. At this stage as small a value as a single prism diopter of convergence or divergence is high quantity.

Recording orthoptic results is very important. A complete record must be kept of the case from the very start. When a program is arranged, it should be recorded and kept with other records pertaining to the case. Treatment by treatment account should be kept, stating the method, cards, and procedures employed. I record all data on a 4x6 ruled card and keep it filed away in a special file. I keep a full account of each treatment and record the progress made. If home training is required, the patient is supplied with the apparatus together with the proper instructions as to its use and he is repeatedly questioned as to the

progress made. It is extremely important that the orthoptist should be constantly aware of how his case is getting along.

A case is ready to be discharged when repeated tests indicate that it has mastered all that was required of it in the program. It is essential to remember that stereopsis is the rule by which the faculty of fusion is measured. Therefore, it is safe to discharge a case when it has acquired the highest degree of fusion and when the amplitude of fusion is so well developed that it will permit of the eventual relaxation and still remain sufficiently strong to prevent a relapse.

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HEALTH SERVICE IN SOVIET RUSSIA

Throughout the world the problem of "Health Service" is receiving consideration from economists, statesmen and the various professions interest in health service, each trying to solve this at times perplexing matter. Obviously the health of the people is of great importance in each and every country no matter what peculiar form of government each may have. In England, Germany, Russia and to some small extent in the United States experiments are now going on in the matter of socialized health service. These experiments may not turn out as well as their originators expected, or they may turn out better. At any rate these experiments are of interest particularly to the professions of Medicine, Dentistry, Optometry and Nursing.

Space will not permit the complete description of the methods, systems and characteristics of all of the socialized health service experiments in the several countries where they are now being carried out, and I shall therefore have to limit my discussion to only one country and in order to draw a picture of the workings of socialized health service I will use the system that exists today in Soviet Russia, because in that country the experiment has been carried farther than in any other coun-

try in the world. I must state at the beginning that I plead no cause, my aim is only to give an account of the existing conditions as I understand them to be from contacts with persons who have traveled in that country to study this problem, as well as from reading books and reports of different communistic medical and sociological authorities interested in this subject.

The problem of socialized health service it seems to me, is of special interest to optometrists at this time because of the pressure now being brought to bear in many centers for a health service set up along these lines, in this country, and we will have a distinct function to perform if these plans carry through. It is of extreme importance also that we be on guard to see to it, that optometry is included in any and all schemes of health service which may evolve either now or in the future.

The most exhaustive study of socialized health service in Soviet Russia is "Red Medicine" written by Sir Arthur Newsholme, M.D., formerly Principal Medical Officer of the Local Government Board of England and Wales, and John Adams Kingsbury, Secretary of the Milbank Memorial Fund, formerly Commissioner of Public Charities, New York City. Before I start discussing the administration of this type of Socialized Health Service it may be of interest first to describe how the personnel which is to administer this service in Soviet Russia is trained.

1. Medical Education: The candidate's application must first be recommended by a workmen's committee, next it must be approved by (1) the administrative medical faculty, (2) the professional staff, (3) the trade unions and (4) the student workers. There is, so I am told, no favoritism shown. The course of study is five years. In the first year the student has to assist in minor medical or surgical work. In the second year he has to help in actual nursing and in the last three years he engages in practical medical work at various hospitals and clinics.

When an applicant is once admitted to the Medical School the government pays all of his expenses at school and he or she is also given a small monthly allowance until the course is completed. Upon graduation a doctor is appointed to a position and is paid the regular salary which is about two and one-half times that of a nurse. Dr. Herbert N. Smith, former president of the South Dakota Optometric Association, who traveled extensively in Russia studying this problem claims that there are three classifications of doctors: a. Ordinary—these are new graduates and are paid 250 rubles a month ($125.00); b. Secondary—these are more advanced and are paid 300 to 350 rubles a month; c. Professors are paid from 400 to 500 rubles a month. Special salaries are given to exceptional men. All persons engaged in health service are paid by the government according to the work and duration of service. The appointment to a staff position is not for life, I am told, but for a specified time. If the doctor does his work well he is then reappointed. General practitioners of medicine are supposed to work six hours a day and rest every fifth day. Specialists in theory at least are to work but four

hours a day. The doctors like the party workers are supposed to receive at least two weeks vacation annually. Rural doctors are to have a four-month vacation tri-annually to avail themselves of the post graduate courses given by the government.

The courses for the ordinary and secondary doctors are five years in length and for the professors six years at college followed by three years of internship. Postgraduate courses of four months duration are given to doctors every three years, according to the authorities already mentioned. The state is doing all in its power to increase the number of available physicians. In 1913 there were 26,000 physicians in Russia, one physician to every 30,000 people, in 1932 there were 76,000 physicians in that country, one to every 7,000 people and the government plans call for one doctor for every 1,000 persons.

Dental service especially in the rural districts is at the present time inadequate but steps are being taken to rectify this condition. Dean Alfred Owre of the School of Dental Surgery of Columbia University who had recently visited the stomatological institutes and polyclinics at Odessa, Kiev, Moscow, and Leningrad, states that "The achievements to date, in spite of tremendous handicaps, are remarkable. . . . Several men I talked with, all M.D.'s, had carried on large-scale experiments in fundamental phases of dental practice. . . . I was astonished at the ingenuity shown in overcoming technical difficulties, for instance, the use of chrome and rustless steel for porsthetic work in place of gold and platinum." Dean Owre tells of the plan to give 10,000 students a three-year training course as dental technicians during the next five years:

". . . They will have the same preliminary education as university entrants. . . . They will get . . . a technical training in routine dentistry about like that of our average D.D.S. They will *not* get a degree. After three years' service in an outlying district, they may return to a university center for scientific work. There they will help in a clinic part of the day and evening. In three and one-half to four years they may complete the work for a medical degree. There are stiff examinations.

. . . In one remarkably well-organized laboratory at Leningrad I saw records to show a turnout of 35,000 dentures monthly, and 7,000 bridges. . . . The dentistry except for 'fancy' dentures and other work chosen in place of simpler types which would serve (e.g., gold plates and bridge work), is practically free. All education is free."

2. How Health Service is administered. The country is divided into seven sections, each section has its own health department in charge of Peoples Commissariat and is in charge of the District and Regional branches. The organization of Public Health and Medical Service is centralized in each section. There is no separation between preventive and clinical service. It all functions in one unit.

The Health Departments (according to Newsholme and Kingsbury), are concerned with the following problems:

1. Therapeutics. 2. Medical work in institutions. 3. Care of mothers and children. 4. Industrial hygiene, factory, doctors, etc. 5. Guarding the health of children. 6. Sanitary conditions of life—a. Feeding and nutrition; b. Housing; c. Water and sewage; d. Epidemiology and prevention of infections. 7. Scientific research. 8. Planning department, this includes finance and statistics. 9. Supply department for food, etc., and for maintenance of the institution.

The finances to keep up this program are derived from the following sources: a. Local taxes are used for supporting local institutions; b. Central funds are used for the maintenance of the medical and other staff; c. Insurance funds supply most of the money needed. The insurance money is used only for insured persons and their families. This group makes up a large, and from a political standpoint, an important part of the entire population.

3. Care of the sick. Health service is rendered in four different places: a. In the home of the sick; b. In the factories where they work; c. In dispensaries; d. In hospitals and other institutions. House calls are discouraged and are made only when the patient is unable to come to the dispensary. If the case is of such nature that it can not be treated at the dispensary then it is transferred to a hospital. The dispensary doctor spends most of his time at the dispensary and the remainder making necessary house calls. A patient may choose his own doctor at the health center for his district, and he can have his doctor changed upon request if he shows reasonable cause. He must, however, go to his district health center. He has the right to complain to the head of the institution or to the Commissariat of Health. A patient may also refuse to be operated upon by a particular surgeon and after a hearing, another one will be appointed to handle the case.

Every doctor is attached to some institution and all services rendered at the institutions are free or nearly so. An official doctor can also have paying patients and patients desiring can have private doctors but they have to pay for this special service from their own personal funds. Most Party workers and their families are furnished free health service as are the insured persons, but the funds for this free service come from general taxation instead of the insurance fund. Those receiving this free service are: all Party trade unionists and their families, all insured persons, all unemployed persons with party affiliations and their dependents and also most students. Persons not affiliated with the Party are not entitled to free service, although they are not cut off from treatment if they are able to pay for it.

Factory hygiene apparently takes an important place in the official health scheme. The work day is a six or seven hour day, depending upon the occupation. The work week is four consecutive days the fifth being the day of rest or an average of 24 working days each month. Every Party worker is entitled annually to two weeks vacation with pay, this

is extended to four weeks in case of trades injurious to health and for minors under 18 years of age.

Each government owned factory or shop has its own physician assigned whose duty it is to not only render aid in case of an accident or illness but also to teach the employees something of the laws of hygiene. In theory the physician is not merely to serve the people of his district when they are sick, but in addition is to teach them how to keep well. A factory worker when ill may be seen at home by the factory doctor if too ill to go elsewhere, otherwise he is sent to the dispensary of his district or else he may be sent directly to a specialist if the factory doctor thinks this is advisable.

4. Characteristics of the Professional Practice. a. From my study it is evident that every doctor is an officer of the state and as such he is not a separate unit but he is part of a coordinated system of health service and health institutions. This insures that in the larger centers at least, every doctor has a constant and ready daily access to expert and institutional help as it may be needed for his patients. The monetary motive has been relieved from operation in medical practice to a certain degree by the government salaries and thus the doctor has been to a degree freed from the field of monetary competition. In theory at least this should result in a high type of practice. While it is true that there still remains some private practice, this is negligible in view of the fact that the public not affiliated with the party has but little money and can therefore afford but little of the health services available.

b. Quality of Service. The important question which suggests itself is this: Can as good health service be expected under this new system as when doctors were in private practice and their livelihood depended upon obtaining and retaining the good will of their fee paying patients? A decade ago when the first move was made to socialize health service in Soviet Russia fear was expressed by many leading members of the medical profession in that country that this plan would result in an inferior type of service. Now some of these very doctors admit that they were mistaken. Some even claim that the removal of the monetary relationship between the doctor and his patient has greatly increased the doctor's power for doing good work both curative and preventive. That financial motives for prompt performance and efficiency carry great weight can not be denied, but in many walks of life they are not the sole determiners of human conduct. There are other motives which play an important part as for example: desire to excel, professional pride, desire to stand well with one's fellows, the satisfaction one gets from doing his work well.

The efficiency of any system of health service is ultimately to be judged by the results it produces in reducing the amount of sickness and the increase in the number of institutions and personnel devoted to safeguarding the health of the people.

The following statistics may be of interest.

Small-pox Cases—Rate per 10,000

1913	30.00 per cent
1919	7.00 per cent
1922	2.00 per cent
1924	0.60 per cent
1928	0.35 per cent

Typhus

1920-21	4,000,000 cases
1925-29 Annual average	40,000 cases

Development of Public Health Organizations

	Sanitary Provisions		
	1927-8	1931	1932
Hospitals for infectious diseases	19,500	32,650	40,554
Laboratories	189	357	575
Disinfection points	56	243	592
Disinfection Stations	13	49	68
Sanitary Doctors	1,289	1,989	3,846

While the investigators I have mentioned speak highly of the Russian experiment in socialized health service they do not overlook the short comings, some of these are: 1. While for four-fifths of the population in the cities and in the majority of the rural districts the uneven cost of medical care has disappeared, it has not completely disappeared for the remaining twenty per cent of the population.

2. There exists a shortage of physicians and of hospitals in the rural districts.

3. Rest homes and sanitariums are unequally distributed.

4. There is a marked shortage of dentists.

5. There is a shortage of nursing service.

6. The income of physicians while it is fair in comparison with other groups of society, it is still lower than that of engineers and teachers.

7. The utilization of preventive measures are insufficient.

8. The inability of the general public to differentiate between good and poor service.

These short-comings, however, are not limited to Russia alone but are to be found in most other countries. For instance, in the report of the Committee on the Cost of Medical Care in America which is the result of a five-year study, we find listed the following short-comings:

1. Uneven distribution in the cost of medical care.

2. Shortage of physicians and hospitals in certain rural areas.

3. General shortage of convalescent facilities.

4. General shortage of dentists to meet the real needs of the people.

5. Inadequacy of personnel and financial support among official health agencies.

6. Inability of many patients to obtain nursing service because of cost.

7. Extensive use of inferior type of treatment and wide-spread self-medication.

8. Low net income of many physicians, dentists and nurses.

9. Insufficient utilization of preventive procedure.

10. Inability of many people to differentiate accurately between good and poor medical service.

Comparing the general short-coming of private health service in the United States with those of the Socialized Health Service in the Soviet Union we find that they have certain points of similarity. With respect to the position of the professional man in the two entirely different systems I'll leave to my reader to judge. Each system obviously has certain short-comings. Whether these short-comings will be remedied sooner under a form of socialized health system than under our present private system is a question no one at present is in a position to answer and it will bear watching with interest. J. I. K.

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BOOK NOTICES

PHYSIOLOGICAL OPTICS. W. D. Zoethout, Ph.D. Second Edition. Published by the Professional Press. 5 North Wabash Ave., Chicago, Illinois. 391 pp. 208 illustrations. $5.00 cloth, 1935.

This work deals with the interesting subject of How and Why we see. The author carefully and in logical order covers the anatomy and physiology of vision: The eye, the orbits and the nervous system as they all pertain to vision. The book is divided into 34 chapters, each in turn divided or rather sub-divided into many important sub-heads. This method, found to be so useful in teaching, is also of great value to the practitioner in using his text books as it makes for rapid-reference work at his office.

This second revised edition of Physiological Optics contains nothing that is essentially new, yet it does contain a vast amount of ocular material of immense value to all optometrists and is a work which should be at hand in every refracting room in the country. Zoethout has kept his feet firmly on the ground in preparing this text and the book is therefore free from many of the fantastic theories now so much in vogue in some optometric circles. For this reason alone it is refreshing to review the foundation upon which optometry is reared and it is doubly pleasant to do so in a book as well put together as this.

Chapter Ten on Retinal Stimulation and the chapters dealing with the extra-ocular muscles, their movements and associated movements and fusions are all very well done and in themselves are the outstanding portions of the work. It is not surprising that this book has gone into its second edition and it will probably have to have several more large printings as it is a work of real merit. C. C. K.

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SCIENTIFIC BASIS FOR THE SELECTION OF BIFOCAL LENSES. Albert L. Anderson. Published by the N. P. Benson Optical Company, Medical Arts Building, Minneapolis, Minn., 22 mimeographed pages, paper covers, illustrated, 1935.

This work consists of two separate monographs both treating the important matter of bifocal fitting. The first deals with the selection of the type and size of bifocal segments. The second with the method of correcting vertical prism imbalances in reading portions of anisometropic prescriptions.

Both papers are well written and completely cover their subjects very thoroughly and in an unbiased manner. No particular bifocal lens is recommended nor is this work in any sense a piece of advertising material. Every type of bifocal lens is mentioned by name and the particular advantage of each is stressed.

A number of unusual and interesting suggestions are made by the author in these papers. For example, combining two different types of bifocal lenses in the same pair of glasses in certain anisometropic cases to equalize the prismatic displacement of the image through the reading segment. The author clearly outlines the procedure to be followed in prescribing such a correction. This is but one of Anderson's many solutions to the ofttime difficult problem of prescribing bifocal lenses and he presents other valuable and novel ideas, each of value.

Anderson has arranged in these two monographs the results of much study in the important field of bifocal fitting. His contribution is of marked value and coming as it does at a time when so many various claims are made by the makers of many, many types of lenses will do much to clear the air in this department of our work.

The Benson Optical Company has performed a real service in publishing this brochure and has advised the writer that while the edition lasts they will be pleased to mail a copy without charge to optometrists who request same. The reviewer suggests, however, that optometrists wishing to avail themselves of this generous offer (and many should) include with their request 10 cents in stamps to cover, at least, the cost of mailing charges. C. C. K.

A COMPLETE INDEX OF VOLUME 12
1935

A

abduction,—(see also extra-ocular muscles and orthoptic treatment....53, 57, 58, 59, 155, 156, 157, 158, 159, 160, 161, 162, 170, 235, 236, 311, 314, 326, 327, 350, 359, 383, 387, 388, 389
Abnormal psychology and its clinical application, J. I. Kurtz 427
absolute convergence (also see convergence)
absorption glass (see also photophobia, glare and tinted lenses).....77, 375
accommodation (see also presbyopia, ciliary muscle, fusion and convergence) 2, 11, 52, 53, 54, 55, 57, 58, 59, 75, 76, 117, 118, 119, 120, 126, 134, 135, 140, 141, 142, 155, 161, 171, 182, 186, 209, 226, 234, 235, 237, 255, 285, 286, 287, 306, 309, 311, 312, 313, 314, 316, 317, 320, 321, 333, 347, 350, 359, 367, 368, 369, 382, 383, 385, 386, 387, 388, 389, 462, 465, 466, 467, 468, 469, 470, 471, 472, 477
Accommodation and Convergence, analysis of data on, Charles Sheard..... 52
accommodation, lag of, (see also lag of accommodation, accommodation and dynamic skiametry)....59, 465, 466, 467
Accommodation, the mechanism of, J. I. Kurtz 285
accommodative exophoria, (see also accommodation and exophoria)
accommodative insufficiency, (see also fatigue, presbyopia and accommodation)....58, 59, 117, 118, 465, 468, 469, 470, 471, 472
Accommodative insufficiency in glaucoma and general disease, J. O. Baxter, Sr... 468
adduction, (see also extra-ocular muscles, convergence, fusion and orthoptic treatment)....57, 58, 59, 155, 156, 158, 160, 161, 162, 163, 170, 236, 314, 316, 326, 350, 359, 382, 383, 385, 386, 387, 388, 439, 466, 467
adrenaline chloride 178
albuminuria, (see also urinalysis and physical examination) 76, 118
Allgaier, Earl 152
Allgaier, E., A note on the explanation of stereoscopic vision for academic purposes 152
ambivert 428
alternating squint, (see also squint, strabismus, extra-ocular muscles and orthoptic treatment).....303, 399, 400, 401
amblyopia, (see also chromagraphology, color field charting, amblyopia ex anopsia and toxic amblyopia)....1, 31, 239, 309, 337, 391, 399, 400, 467
amblyopia ex anopsia, (see also orthoptic treatment, amblyopic flasher color field charting and amblyopia)....25, 27, 82, 226, 227, 228, 230, 231, 304, 318, 321, 322, 324, 325, 328, 329, 394, 395, 396, 397, 400, 450, 451, 452, 457, 458, 467, 473, 474, 475
amblyopic flasher, (see also amblyopia, amblyopia ex anopsia, retinal stimulation syntonics and orthoptic treatment....228, 229, 324, 328, 395, 400, 450, 452, 474, 478
amblyopic reader, (see also orthoptic treatment) 457, 458
amblyoscope, (see also fusion and orthoptic treatment) 392
amblyoscopic treatments (see orthoptic treatment)
American Academy of Optometry....181, 188, 195, 237, 238, 259, 266
American Association for the Advancement of Science 85
American Journal of Optometry....12, 14, 16, 41, 42, 79, 82, 84, 86, 124, 125, 155, 167, 168, 209, 222, 234, 237, 320, 321, 369, 461
American Journal of Physiological Optics 154
American Journal of Psychology....159, 237
American Optometric Association..85, 90, 154
Ames, A., Jr.....259, 264, 265
Analysis of data on ocular convergence and Accommodation. Part IV., Charles Sheard 52
Anapolle 396
Anderson 258
Anderson, Albert L..... 488
anemia, (see also blood analysis and physical examination) 76, 469
aniseikonia, (see also size and shape of retinal images)
anisometropia, (see also skiametry-static and subjective tests)....11, 12, 226, 263, 295, 296, 297, 298, 299, 300, 303, 315
Anisometropia, the relationship to eyedness, T. H. Eames..... 295
anterior chamber, (see also cornea, aqueous, iris and conjunctiva).....305, 470
aphakia, (see also crystaline lens, cataract and sub-normal vision)..... 11
aqueous, (see also external ocular examination and slit lamp).....17, 270, 271, 363, 364, 421, 424
argyll-robertson pupil, (see also syphilis, accommodation, iris and external ocular examination)....253, 255, 256, 257, 258, 306, 374
Archives of Ophthalmology..... 375
Argyll-Robertson Pupil and its significance, F. W. Brock 253
Argyll-Robertson pupil, T. G. Atkinson.. 374
Arneson, T. J. 220, 368
Armstrong, Mollie 370
arterio-sclerosis, (see blood pressure tests and physical examination)..... 76, 363, 418, 419, 420, 421, 424, 425
arteries, (see also blood pressure, veins, blood bessels and ophthalmoscope).....79, 307, 308, 418, 419, 421, 471
Asarkoff, John E.....450, 451
Asarkoff, J. E., An illuminating unit for orthoptic training 450
asthenopia, (see also symptoms, pain and headache).....1, 8, 18, 24, 31, 120, 181, 237, 259, 323, 366, 369, 471
astigmatic chart, (see also astigmatism, test chart, cylindrical lens and subjective tests) 42, 81, 135, 136
Astigmatic cases, refraction at the bedside, C. C. Koch..... 41
astigmatism, (see also ophthalmometer, keratometer, cornea, refraction and subjective tests) 2, 3, 8, 11, 12, 13, 14, 15, 16, 17, 19, 23, 24, 25, 26, 27, 41, 42, 80, 87, 88, 118, 124, 129, 130, 135, 136, 139, 140, 142, 171, 266, 267, 268, 269, 270, 276, 277, 278, 279, 280, 281, 303, 307, 321, 325, 326, 344, 346, 359, 459, 460, 461, 462, 463, 464, 471, 476
Astigmatism, oblique muscles in, G. L. DuPlessis 459
Astigmatism-Torsions and their effect on each other, G. L. DuPlessis..... 11
Astigmia, corneal, G. A. MacElree and J. F. Morrow..... 266
Atkinson, T. G.....60, 272, 276, 284, 374
Atkinson, T. G., The argyll-robertson pupil 374
Atlantic Monthly 85, 86
atropine, (see also cycloplegics and homatropine and belladonna).....317, 318, 319, 321, 363, 399
Auerbach, S. 344, 361
Auto-Intoxication, an ocular diagnosis for intestinal, R. E. Simpson..... 74
auto-intoxication, (see also focal infection, symptoms, constipation and physical examination).....74, 77, 118

B

Bacon, C. A. 149
Baker 345, 361
Baldwin, J. M..... 149
Ballard, P. B. 149
Balyeat, R. M.....344, 361
Banister, H. 416
Barnes, R. 149
Barton, E. A. 149
Barton, J. K. 343
Baudouin, Charles 446, 449
Bausch and Lomb Optical Company..... 375
Baxter, James O., Jr.....362, 404, 405
Baxter, J. O., Jr., Osmotic phenomena in relation to glaucoma..... 362
Baxter, J. O., Jr., Suggestions for adequate Optometric extension 404

Baxter, James O., Sr.....418, 468
Baxter, J. O., Sr., Accommodative insufficiency in Glaumoca and general disease 468
Baxter, J. O., Sr., A Theory and non-surgical treatment of glaucoma for optometrists 418
Beacher, L. Lester..259, 260, 261, 262, 263, 265
Beacher, L. L., Measurements in the size and shape of ocular images..... 259
Bedside refractions of astigmatic cases, C. C. Koch 41
Beeley, A. L. 151
Behr 255, 258
belladonna, (see also cycloplegics, and atropine and homatropine) 76, 469
Benedict, W. L.....30, 31, 34, 36
Bennett, R. W..... 82
Benson, N. P..... 488
Bernheim, M. 444
Bertleson, K. 151
Best, Harry 417
Better Vision Institute 85
Betts, E. A.....171, 173, 174
bichrome check-test, (see also bichrome refraction, and duochrome refractions)
bichrome refraction, (see also duochrome refraction, and bichrome check-test)
bifocals, (see also accommodation and presbyopia).....28, 212, 215, 220, 312, 322, 370, 371, 488
Bifocals, unusual uses for, Koch, C. C. 370
bilateral squint, (see also squint, extra-ocular muscles, strabismus and orthoptic treatment)
Billings, Curtis 86
Billings, F. 29, 35
binocular loupe, (see also loupe, and external ocular examination) 121
Bjerrum 310
Bjerrum screen, (see also campimetry, color field charting and retina)..... 309
Black, A. D. 34, 36
blepharitis, (see also lids, lashes and focal infection) 75, 117
blepharospasm, (see also lids)..... 117
blindness, (see also amblyopia and subnormal vision).....305, 339, 340, 375, 417
blind spot, (see also fundus, retina, perimeter, ophthalmoscope and optic disc).....309, 310, 397
blood analysis, (see also laboratory examination, blood vessels, veins and arteries) 75, 332
blood pressure, abnormal, (see also symptoms, physical examination, blood pressure tests, blood vessels and blood analysis) 308, 469
blood pressure tests, (see also blood analysis and blood vessels)....212, 215, 220
blood vessels, (see also veins, arteries, retina, fundus, and ophthalmoscope).. 29, 30, 83, 88, 126, 307, 308, 342, 345, 418, 419, 420, 421, 424, 425, 470, 471
blur-circles (see also retina)....128, 129, 130, 131, 132, 133, 134, 135, 137, 138, 140
blur point, (see also accommodation, phoria tests, and adduction and abduction) 155, 314, 315, 320
bone, (see also orbit, teeth and jaw)..30, 83
Books Reviewed
Amblyopic Reader, Dobson 457
Bifocal Lenses, the selection of, Anderson 488
Blindness and the Blind in the United States, Best 417
Lenses and Optical Glass, Obrig..... 375
Ophthalmology, Text book of, Duke-Elder 292
Ophthalmoscopy, Retinoscopy and Refraction, Fisher 335
Physiological Optics, Zoethout 487
Practice of Refraction, Duke-Elder.... 126
Psychology and Health, Banister..... 416
Strabismus, Contonnet & Filliozat..... 210
Bowman, H. 151
Braille 200
brain, (see also oculomotor nuclei, optic nerve and visual centers of the brain) 23, 75, 124, 226, 253, 254, 255, 256, 260, 297, 332, 344, 347, 378, 379, 427, 464, 469
Bray, G. W. 343, 361
Brewster 269
Brinton, D. G. 68
British Journal of Ophthalmology..... 286
British Journal of Physiologic Optics.. 1, 318, 336
British Optical Association 1
Brock, Frederick W.....253, 256, 374
Brock, F. W., The Argyll-Robertson pupil 253
Brouwer 255, 258
Brown, E. V. L.....29, 33, 36
Brubaker, A. P.....272, 276, 284
Bruner, Abram B.....240, 241, 249
Brust, P. R.....55, 60
Buchanan 69
butyn, (see also sub-normal vision)....177, 178, 179

C

Cahall, W. C..... 149
Caille, A. 151
California State Association of Optometrists 169
campimeter, (see also visual field charting, retina, fundus and color field charting) 38, 39, 340, 471
campimetry, (see also perimetry, color field charting and visual field charting) 38, 39, 340, 341, 471
canal of schlemm, (see also glaucoma and ciliary body) 418
carbon arc lamps, (see also physical therapy, infra-red radiations, heat, and visible light) 422, 425
Carleton, Elmer H.....259, 264, 265
Carlyle, Thomas 73
case history, (see also history, symptoms and record charts).....56, 171, 224, 302, 372, 399
cataract, (see also subnormal vision, crystaline lens and the use of red-free glass).....75, 76, 188, 189, 190, 191, 192, 193, 194, 240, 306, 335, 417, 422, 471
Cataract cases, the use of red-free glass in, E. E. Hotaling and E. LeRoy Ryer.. 188
cathode rays, (see also invisible spectrum) 83
Cautions concerning illumination intensities used for reading, Miles A. Tinker 43
Chamberlain, H. D.....70, 71, 151
Charcot 443
chart, (see also record chart).....302, 312
cheiroscope, (see also field charting and orthoptic treatment) 87, 392
choroditis, (see also focal infection and choroid) 33, 76, 240, 307
choroid, (see also fundus, choroiditis and ophthalmoscope)....30, 31, 35, 196, 240, 333
Chossat.....269, 272, 273
Christian Science 427
chromagraphology, (see also color field charting, amblyopia, amblyopia ex anopsia and toxic amblyopia)..... 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223
chromagraphs, (see also focal infections, visual field charting and color field charting).....211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223
Chromography, D. J. Mayer..... 211
Chrysler Corporation 87
ciliary body, (see also accommodation, ciliary muscle and slit-lamp).....30, 35, 286, 304, 377, 419, 420, 424
ciliary muscle, (see also ciliary body, presbyopia, cycloplegic and accommodation) 3, 8, 117, 119, 120, 182, 254, 285, 286, 311, 315, 317, 319, 333, 347, 363, 367, 466, 469
ciliary relaxation, (see also atropine, cycloplegics, suppression lenses and orthoptic treatments)
ciliary tonicity, (see also accommodation, tonicity and nerve force)..... 52
Clark 286
Clark, Brant.....9, 169, 172, 173, 174
Clark, Brant, Heterophoria in College Students 9
Clark, Brant, The importance of the correction of ocular defects in a remedial reading program. Results of recent research 169
clayson visual acuity meter, (see also test chart) 87, 88, 393
Clinic, a portable research, A. R. Lauer 85
clinics, optometric, (see also education, schools and courses).....366, 377

clinoscope, Stevens 23
Coe, E. A. 171
Cohen, J. Robinson 127
Cohen, J. R., An improved technique for the subjective measurement of ocular refraction 127
cold application, (see also physiotherapy) 125
colitis, (see also colon, auto-intoxication and constipation) 75
colon, (see also constipation, auto-intoxication and physical examination)
color blindness, (see also color tests, color field charting and dyschromotopsia) 335, 445
color field charting, (see also perimetry, amblyopia, chromagraphology, amblyopia, amblyopia ex anopsia and toxic amblyopia)....38, 76, 77, 211, 309, 397, 445
color filters, the use of in orthoptic treatment, (see also orthoptic treatment).... 395, 396
color tests, (see also color vision and color blindness) 171, 372
color vision, (see also color tests and color blindness) 88
Columbia University 405, 483
Colyer, H. 151
comitant squint, (see also squint, extra-ocular muscles, stabismus and orthoptic treatment)
comparator, (see also orthoptic treatment) 3
concave lenses, (see also myopia and spherical lenses) 52, 380
congenital amblyopia (also see Amblyopia)
conical cornea, (see also sub-normal vision, ophthalmometer and external ocular inspection) 310
conjunctiva, (see also external ocular inspection and conjunctivitis).....214, 216, 304, 363, 470
conjunctivitis, (see also pink-eye, focal infection and conjunctiva).....31, 75, 117
Conklin, E. S. 449
constant squint, (see also squint, extra-ocular muscles, stabismus and orthoptic treatment)
constipation, (see also auto-intoxication, colon and physical examination).....76, 78
consultations, (see also physical examinations) 75, 77, 78
contact lenses, (see also conical cornea, cornea and sub-normal vision) 11 177, 178, 179, 180, 205, 206, 375
Contonnet, A. 210, 390, 393
convergence, (see also extra-ocular muscles, fusion and adduction.....21, 28, 52, 53, 54, 55, 58, 117, 118, 119, 120, 126, 155, 156, 157, 158, 159, 160, 161, 162, 170, 171, 172, 182, 186, 209, 226, 234, 235, 237, 255, 257, 306, 313, 320, 333, 366, 367, 368, 369, 383, 462, 465, 466, 467, 469, 472, 476
convergence, absolute and relative (see convergence)
Convergence and Accommodation, analysis of data on, Charles Sheard..... 52
Convergence, negative fusional, H. S. Horton 155
Convergence, negative fusional, W. J. Tait 234
Convergence requirements, standards insupportable, J. R. Stebbins..... 366
convergent squint, (see also squint, stabismus, extra-ocular muscles and orthoptic treatment)....303, 331, 399, 400, 477
convex lenses, (see also hyperopia and spherical lenses).....52, 53, 380, 466
Cook, T. J. 32, 33, 36, 37
Coolidge, Calvin 411
Coons, J. C. 150
Coque, Max 210
cornea, (see also external ocular inspection, corneal and opacities, corneal ulcers and focal illuminations)..... 11, 12, 13, 14, 15, 17, 121, 122, 177, 195, 196, 228, 240, 266, 268, 269, 270, 271, 272, 274, 276, 278, 280, 282, 283, 304, 305, 318, 362, 363, 364, 365, 378, 421, 422, 423, 460, 470, 471
Cornea, the technique of removing a foreign body from the anterior surface of, N. B. Hays 121
Corneal Astigmia, G. A. MacElree and J. F. Morrow 266
corneal scars, (see also external ocular inspection, slit-lamp and cornea)..... 423
correct-eye-scope, (see also squint and orthoptic treatment) 324, 397
cosmic rays, (see also invisible spectrum) 84
courses, optometric, (see also education, schools and courses) 366, 404
cover test, (see also external ocular inspection, squint, stabismus and extra-ocular muscles) 303
Cowan, John 82
Cox 320
cranial nerves, (see also second, third, fourth, fifth, sixth and seventh nerves) 377
Creswell, R. 150
Crisp, W. H. 345, 361
Critchley 342, 361
Crookshank 344, 361
cross cylinder, (see also accommodation, subjective tests and convergence)..3, 5, 16, 57, 80, 81, 139, 361, 385, 387
Cross cylinder check test, the duochrome, W. Smith 80
cross cylinder test, (see also subjective tests, accommodation and cross cylinder)...3, 5, 80, 81, 326, 385, 386, 387, 388, 389
Crow, George 60
Cruse, Lyle M. 157
Cruttenden, L. M. 33, 36
crystaline lens, (see also ophthalmoscope, slit-lamp cataract, lenticular opacities, and focal illumination)...12, 76, 77, 119, 120, 178, 188, 196, 240, 254, 270, 285, 286, 306, 307, 377, 378, 424, 466, 467, 471
Cuff, N. B. 151
Cunningham, D. J. 68, 69, 70, 149, 369
Cutsforth, T. D. 248, 249
cyclitis, (see also focal infection and ciliary body).....305, 307, 311
cyclodamic test, (see also subjective tests)
cyclophoria, (see also torsions and extra-ocular muscles).....2, 4, 8, 11, 23, 24, 26, 316, 347, 348, 359, 460
cycloplegics, (see also belladona, atropine and homatropine).....26, 119, 316, 317, 318, 319, 363
cylinder telescopic spectacle, (see also subnormal vision and telescopic spectacle) 243, 244, 245
cylindrical lens, (see also astigmatism, ophthalmometer and astigmatic chart) 5, 7, 8, 12, 13, 15, 24, 26 27, 42, 75, 81, 138, 139, 196, 310, 464
cyst, follicular, (see also lids)..... 117

D

dacryocystitis, (see also lacrymal sac).. 304
Dalrymple 304
Dartmouth College.....259, 260, 261, 264
Davis, A. E. 60
DeMars, Louis L. 377
DeMars, L. L., The 18 point refractive routine 377
dental examination, (see also focal infection, dentist and teeth)..... 29
Dental examination in ocular disorders, the value of, G. A. Morgan..... 29
dental surgeon, (see also dentist)....29, 30, 34, 307
dentist (see also teeth, focal infection and dental surgeon).....29, 34, 35, 214, 220, 264, 288, 311
depth perception, (see also convergence and accommodation)
depth perception test, (see also accommodation, extra-ocular muscles and convergence)
Descartes, Rene 55
DeSchweinitz, G. W. 30, 36, 472
detachment of the retina, (see also ophthalmoscope, fundus and retina)
diabetes, (see also symptoms and cataract) 76, 419, 420, 469
diatheramy, (see also high frequency and physiotherapy) 125
diagnosis of squint, (see also cover test, external ocular inspection and squint) 303, 318
Dioptric Bulletin 82
Dioptric Review 3

diplopia, (see also symptoms, extra ocular muscles, toxemia and squint)..... 26, 227, 329, 330, 460, 464, 465, 475
divergent squint (see also squint, strabismus, extra-ocular muscles and orthoptic treatment) 303, 474
dizziness, (see also nausea, headaches and symptoms) 74, 430
Dobson, Margaret 60, 457, 458
Doland, Charles K. 158
Dolan, L. C..... 150
dominant eye, (see also handedness and eyedness) 295, 296, 297, 298, 299, 300, 372, 399
Donders 286, 465
Downey, J. E.....150, 151
drops, (see also cycloplegics and mydriatics) 319
Duane, Alexander 60, 286
Dubois 446, 447
duction tests, (see also convergence, abduction, adduction and extra-ocular muscles) 28, 54, 56, 57, 163, 215, 232, 289, 314, 316, 320, 330, 350, 359, 369, 372, 383, 384, 387, 388, 389, 400, 468, 472, 475, 476
Duke-Elder, Sir Stewart....126, 143, 255, 256, 258, 292, 293, 332
Duochrome-Cross cylinder check test, W. Smith 80
duochrome refraction, (see also bichrome refraction, and bichrome check-test)..80, 81
DuPlessis, G. L.....11, 459, 461
DuPlessis, G. L., Astigmatism-Torsions, their effect on each other..... 11
DuPlessis, G. L., Oblique muscles in ocular rotation and astigmatism 459
Dupont 320
dynamic retinoscopy, (see also dynamic skiametry, skiametry-dynamic, retinoscopy and static skiametry)..... 3, 359, 360, 382, 383, 384, 385, 386, 388, 389, 465, 467
Dynamic retinoscopy, lag in, L A. Swann 465
dynamic skiametry, (see also skiametry-dynamic, retinoscopy, skiametry and references to A. J. Cross).....26, 56, 59, 126, 321, 326, 399
dyschromotopsia, (see also color blindness) 445

E

Eames, Thomas Harrison.....170, 172, 174, 175, 295, 300
Eames, T. H., Relationship of anisometropia and eyedness 295
ear, (see also hearing)..... 30
East Cleveland Clinic 368
Ebinger, G. 151
ectropion, (see also lids and lashes).... 304
Eddy, Mrs. Baker 428
education, optometric, (see also schools, clinics and courses).....40, 41, 288, 404
Educational Standards Improving, C. C. Koch 40
eighteen-point refraction technic, (see also twenty-one point refraction technic, refraction and education)....212, 366, 368, 377, 381, 382, 383, 387, 469
Eighteen point refractive routine as presented by the Graduate Clinic Foundation, L. L. DeMars..... 377
electric heating pad 125
Eliot, Charles W. 411
Ellis, A. R. 86
emmetropia....80, 81, 119, 129, 131, 132, 172, 182, 334, 465
endocrine glands 75
entropion, (see also lids and lashes).... 304
episcleritis, (see also sclera, sclerotic coat and scleritis).....32, 304
equilibrium test.....3, 4, 5, 6, 7, 8
Equipment, optometric investment in, C. C. Koch 402
Esdaile, A. J.....1, 3, 4, 6, 7, 316
Esdaile-Turville equilibrium test....3, 4, 5, 6, 7, 8, 316
eserine, (see also miotics).....319, 363
esophoria, (see also convergence, abduction, extra-ocular muscles and orthoptic treatment).....10, 55, 119, 157, 182, 183, 184, 185, 186, 312, 317, 326, 347, 350, 359, 369, 386, 459, 462, 467
esotropia, (see also extra-ocular muscles, squint, stabismus and orthoptic treatment) 303, 329, 399, 473
Essex County Optometric Clinic..... 195
Estabrooks, G. H. 151
esthesiogenics 428
euphthalmine, (see also mydriatics and homatropine-hydrobromide) 319
exodontist, (see also dentist, focal infection and teeth) 78
exophoria, (see also convergence, extra-ocular muscles, and orthoptic treatment) 9, 10, 55, 56, 57, 59, 74, 78, 119, 159, 161, 170, 172, 173, 181, 182, 183, 184, 185, 186, 187, 236, 312, 315, 316, 320, 347, 348, 350, 369, 382, 383, 384, 385, 386, 387, 439, 462, 466, 467, 476
exophthalmic goitre, (see also goitre and exophthalmos) 304
exophthalmos, (see also external ocular inspection, veins and goitre)..... 303
exotropia, (see also extra-ocular muscles, squint, stabismus, and orthoptic treatment) 303, 329, 397, 474
Extension, Optometric, suggestions for adequate, J. O. Baxter, Jr..... 404
external examination, (see also external ocular inspection, focal illumination and slit lamp)..... 212
external ocular inspection, (see also slit-lamp focal illumination and external examination) 177, 212, 372, 470, 474, 476
extra-ocular muscles, (see also abduction, adduction, convergence and orthoptic treatment) 2, 18, 19, 20, 21, 55, 83, 119, 120, 125, 181, 182, 183, 184, 185, 186, 187, 209, 210, 212, 215, 216, 224, 225, 226, 227, 228, 235, 236, 251, 257, 303, 311, 312, 313, 314, 315, 316, 317, 319, 320, 323, 326, 333, 347, 348, 377, 378, 394, 398, 399, 400, 439, 459, 474, 475, 477
Extra-Ocular muscles, the distribution of tonic reciprocal innervation to the, W. O. Vivian 181
extrovert 428, 429
eyeball, (see also globe of eye, glaucoma, and intra-ocular tension).....13, 304, 334, 377, 378, 420, 422, 423
eyedness, (see also handedness and dominant eye) 295, 298, 299, 300
Eyedness and its relationship to anisometropia, T. H. Eames..... 295
Eye, ear, nose and throat specialist, (see also ophthalmologist) 214
eyelashes, (see also lashes, lids, ectropion, and entropion) 304
eye-shade, (see also photophobia and glare) 77
eye-snare, (see also foreign body on the cornea) 121, 122
eye specialist (See also optometrist, oculist, ophthalmologist, refractionist and orthoptist)....35, 74, 75, 76, 78, 410, 478, 479
eyestrain (see also symptoms, history and (headaches)..2, 43, 49, 117, 120, 343, 345, 348, 380, 381, 386, 388, 430, 442
Eye strain, functional, F. E. Holder..... 117

F

Fagen, L. B..... 151
false squint (see also squint, strabismus, extra-ocular muscles and orthoptic treatment) 400, 401
Fantus, B. 124
Farris, L. P.....171, 172, 175
far-sight (eye hyperopia)
fatigue (see also symptoms and accommodative insufficiency)...58, 59, 89, 133, 181, 359, 367, 383, 388, 430, 441, 442
Fatigue effects in visual readjustment, Z. J. Schoen 164
Feinbloom, William.....180, 197, 200, 204, 206, 238, 241, 249, 375
Feinbloom, W., A report of 500 cases of subnormal vision 238
Feinbloom subnormal vision reading card (see also telescopic spectacles and subnormal vision) 204
Ferguson 342, 361
Ferree, C. E.....48, 49, 50
Fiberloid Corporation of America..... 396
Field studies, visual, C. C. Koch..... 38

fifth nerve (see also cranial nerves)....31, 377
Filliozat, J.....210, 390, 393
filters, colored (see also duochrome tests)
Fincham 310
Finnoff, W. C.....33, 36
Fischer, V. E.....428, 441, 449
Fischer, F. A..... 335
Fisher, J. H.....344, 361
F—L test (see also fusion, stereoscope and orthoptic treatment) 231, 232
Flieringo, H. J..... 286
fluorescent screen (see also X-rays)..... 83
focal infections (see also toxic amblyopia, toxemia and color field charting)....29, 30, 31, 32, 34, 35, 118, 212, 213, 215, 216, 218, 221, 222, 223, 306, 311, 431, 469
focal illumination (see also slit lamp, external ocular inspection and external examination)
foetus 91
fogging tests (see also subjective tests, accommodation, refraction and ocular refraction) 141
foot-candle meter (see also illumination)
Ford, Henry 403
Foreign bodies, their removal from the anterior surface of the cornea, N. B. Hays 121
foreign body on the cornea (see also eye snare and cornea) 121, 122
fourth nerve (see also cyclophoria and trochlear nerve).....19, 225, 319, 377, 459
fovea (see also macular area, fundus, retina and ophthalmoscope).....39, 338
frame measurements (see also interpupillary gague)
French, J. W..... 154
Fridenwald 425
Fuchs.....286, 363, 425, 426, 469, 472
Functional Eye Strain, F. E. Holder..... 117
fundus (see also retina, macular area and ophthalmoscope)..75, 76, 77, 196, 371, 381, 476
fusion (see also convergence, extra-ocular muscles, accommodation and orthoptic treatment)....53, 54, 226, 227, 230, 231, 234, 235, 257, 264, 320, 321, 322, 323, 324, 326, 327, 329, 330, 378, 383, 387, 397, 398, 400, 401, 465, 467, 473, 474, 475, 476, 479, 480
fusion training (see also orthoptic treatment, stereoscope and telebinocular)... 230, 231, 322, 324, 395, 397, 477, 478

G

gall bladder (see also gall stones).....76, 343
gall stones (see also gall bladder).....77, 343
gamma rays (see also invisible spectrum) 84
Gardiner, B. S.....32, 36
General Electric Lighting Research Laboratory 43, 44
genito-urinary tract 29
George Washington University.....64, 91, 109
Gesell, A. L..... 70
giddiness (see also nausea and symptoms) 302, 309
Gillies, M. D..... 50
glare (see also illumination, lighting and hygienic illumination).....49, 132, 222
glarometer (see also glare, and illumination) 87, 88
Glass, C. C. Koch..... 167
glass, manufacture of.....167, 168, 375
glass, transmission of light through (see also index of refraction of glass)..... 126
glaucoma (see also intra-ocular tension, sub-normal vision and symptoms)..... 240, 304, 305, 308, 309, 311, 335, 362, 363, 364, 365, 418, 420, 422, 423, 424, 425, 468, 469, 470, 471, 472
Glaucoma, accommodative insufficiency in, J. O. Baxter, Sr..... 468
Glaucoma, osmotic phenomena in relation to, J. O. Baxter, Jr..... 362
Glaucoma, the non-surgical treatment of, J. O. Baxter, Sr..... 418
Gliddon, Gordon H.....259, 264, 265
globe of eye (see also eyeball and intra-ocular tension) 333
Gobar, F. H.....55, 60
goitre (see also visual field charting, symptoms, and exophthalmic goitre)
Goldnamer, W. M.....270, 272, 276, 284
Gollinger, Amelie 238
gonococcal infection (see also argyll-robertson pupil and physical examination) 33
Good Housekeeping 43
Gordon, E..... 151
Gould, G. M.....149, 337, 344, 361
Gradle.....239, 240, 241, 249
Graduate Clinic Foundation.....212, 366, 368, 377, 405, 468, 469
Graduate Clinic, 18 point refraction routine, L. L. DeMars..... 377
Gray 369
Greenfield, Moses 238
Greenwood, A. 33, 36
Guild, J. 39
Gulstrand.....13, 17, 270, 272
gums (see teeth, dental examinations, mouth and focal infections)..... 307

H

Haddon 69
Haden, R. L.....29, 32, 36
Haefner, R. 151
Hall, R. M.....391, 393
Handedness (see also eyeness and dominant eye)....62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 103, 104, 105, 106, 107, 108, 109, 111, 112, 113, 144, 145, 146, 147, 148, 149, 299, 476
Handedness, a study into the factors entering into the determination of, L. H. Kraskin.....62, 91, 144
Hanle, Frederick W..... 206
Hare, R. A..... 86
Hart, B. 447, 449
Harvard University 264, 411
Haynes, C. K..... 168
Hays, Norman B..... 121
Hays, N. B., The technique of removing a foreign body from the anterior surface of the cornea 121
head (see also headache and symptoms) 213, 347
headache (see also asthenopia, migraine, symptoms and pain).....31, 74, 75, 76, 77, 118, 124, 302, 309, 322, 337, 338, 339, 342, 343, 347, 349, 357, 358, 360, 380, 381, 430, 439, 442, 471
Health service in Soviet Russia, J. I. Kurtz 481
heart (see also physical examination).... 419
heart, involvements of (see also symptoms)
heat (see also infra-red lamp, infra-red radiations, invisible spectrum and physiotherapy).....84, 125, 208, 364, 365, 421, 422, 423, 424, 425
Heat, the application of in orthoptic treatment work, C. C. Koch..... 125
Heinlein, J. H..... 150
Helmholtz, von.....22, 143, 154, 269, 272, 276, 284, 285
hemorrhages of the retina (see also retina, fundus and ophthalmoscope)
Henker, Otto 143
Hercules 68
heredity 71, 112, 145, 343
Herring 285
heteronymous hemianopsia (see visual field charting, perimetry and campimetry) 445
heteronhoria (see also exophoria, esophoria, phoria tests and extra-ocular muscles.....9, 23, 24, 27, 170, 210, 227, 321, 323, 345, 398, 399, 476, 478
Heterophoria in College Students, Brant Clark 9
heterotropia (see also strabismus, squint and extra-ocular muscles)..... 27, 227, 323, 475, 478
high frequency (see also diatheramy, and physiotherapy)
Higley, H. R..... 42
history (see also case history, symptoms and record charts).....56, 195, 212, 216, 250, 252, 288, 302, 360
Hoff, Henry J..... 238
Holder, F. E.....117, 209
Holder, F. E., Functional Eye Strain..... 117
Hollingworth, H. L.....432, 433, 449
homatropine (see also cycloplegics, and atropine and belladonna).....318, 319, 363
homatropine-hydrobromide (see also mydriatics and euphthalmine)..... 319

homonymous-hemianopsia (see also visual field charting, campimetry and perimetry) 445
Horsley-Clarke stereo-taxic instrument.. 253
Horton, Hammond S.....155, 234, 235, 236, 237, 258, 367, 368, 369
Horton, H. S., Negative fusional convergence 155
Hotaling, Elmer E.....12, 13, 188, 238
Hotaling, E. E., Red-free glass in cataract cases 188
hot-water bag (see also heat)..... 125
Householder, F. L.....214, 217, 221, 222
Howell 367, 369
Hunt, T. C.....343, 361
Hurst, A. T..... 343
Hutchins, Harry 371
Hutchinson 258
Huxley Memorial Lecture..... 68
hyaloid artery (see also arteries and blood vessels)
hygienic illumination (see also lighting, illumination and glare).....43, 44, 45, 46, 47, 48, 49, 50
hyperopia (see also far-sight, subjective tests, and skiametry static and skiametry dynamic)....2, 3, 13, 14, 15, 16, 17, 31, 80, 81, 82, 117, 118, 119, 128, 129, 132, 139, 140, 162, 171, 172, 296, 309, 311, 317, 319, 321, 325, 344, 346, 348, 439, 462
hyperphoria (see also phoria tests and extra-ocular muscles)....2, 4, 5, 8, 54, 315, 316, 347, 348, 350, 359, 360, 369, 459, 462
hypertropia (see also squint, strabismus and extra-ocular muscles).....257, 473
hypnotic suggestion 428
hypophoria (see also hyperphoria)..... 54
hysteria (see also symptoms).....226, 439, 441, 443, 444, 445, 477, 478

I

illumination (see also glare, lighting and hygienic illumination).....43, 44, 45, 46, 47, 48, 49, 50, 132, 471
Illumination intensities used for reading, cautions concerning, Miles A. Tinker... 43
Illumination, natural, Ophthalmoscopy under, C. C. Koch..... 371
Images, measurements in the size and shape of ocular, L. L. Beacher..... 259
Imbrie 131, 143
index of refraction of glass (see also glass, transmission of light through).. 126, 131, 270
influenza (see also conjunctivitis and symptoms) 311, 469
infra-red lamp (see physiotherapy, infra-red radiations and heat).....125, 364, 422
infra-red radiations (see also heat, spectrum, invisible spectrum and physiotherapy) 84, 422, 425
inner canthus (see also lids)
insanity (see also hysteria and symptoms)
insomnia (see also symptoms)..... 430
Institute of Ophthalmic Opticians..... 301
interpupillary gague (see also facial measurements) 171
intestinal ambea (see also focal infection) 216
Intestinal Auto-Intoxication, an ocular diagnosis for, R. E. Simpson..... 74
Intra-ocular pressure, increased as a cause off myopia, J. I. Kurtz..... 333
intra-ocular tension (see also external ocular inspection and glaucoma)...304, 332, 333, 334, 363, 364, 418, 420, 468, 470, 471
introvert 428, 429, 430
invisible spectrum (see also ultra-violet and infra-red radiations, spectrum and heat and light and X-Rays).....83, 84, 425
Iowa State College.....85, 152, 174
iris (see also external ocular inspection, iritis and pupil).....30, 31, 35, 253, 254, 305, 306, 363, 364, 377, 424, 470
iritis (see also focal infection and iris)... 31, 32, 33, 76, 305, 306
Irons, E. E.....29, 33, 36
iseikonia (see also size and shape of retinal image)
iseikonic lenses (see also size and shape of retinal images) 376
Ishihara test for color vision (see also color vision) 87
Ives visual acuity chart (see also visual acuity and test chart)..... 218

J

E. Jackson 5
Jaeckle, Charles E.....195, 196, 201, 202, 203
Jaeckle, C. E., Subnormal vision from infancy, a case report..... 195
Jaeger near-point test types (see also test types near-point) 77, 322
James, Wm. 149
Janet, P.....441, 443, 444, 446, 447, 448, 449
Jaques, Louis.....60, 344, 361
jaundice (see liver, blood analysis and physical examination) 78
Javal, Emile.....12, 13, 14, 15, 16, 266, 267, 268, 269, 271, 272
Javal rule, the (see also astigmatism and ophthalmometer).....12, 13, 14, 15, 16, 381
jaw (see also bone)..... 30
Jenson, George C..... 408
Jenson, G. C., Modern methods of practice building 408
Jones, D. C..... 148
Jones, H. E..... 150
Journal of Applied Psychology..... 86
Journal of General Psychology..... 164
Journal of the American Medical Association 124, 371, 375
Journal of the Iowa State Medical Society 209

K

Kamm, B. 151
Kane, Howard.....64, 92, 94
Keevil, G. W.....34, 37
Keilty, R. A.....33, 36
Keith, Sir Arthur..... 332
Kellog, J. H..... 125
Kennedy, John B..... 411
keratitis (see also ciliary body and focal infection) 30, 31
Keratoconus, a case of, H. L. Salov..... 176
keratoconus (see also cornea and contact lenses) 11, 176
keratometer (see also ophthalmometer, astigmatism and cornea).....266, 267, 268, 270, 273, 274, 276, 277, 278, 279, 280, 281, 282, 326
kidney (see also nephritis and physical examination) 76, 419
King Rameses 68
Kingsbury, John Adams.....482, 483
Knight, Arnold C..... 158
Koch, C. C.....38, 39, 41, 42, 60, 82, 83, 84, 124, 125, 126, 167, 168, 209, 252, 371, 372, 373, 375, 404, 457, 488
Koch, C. C., Bedside refractions of astigmatic cases 41
Koch, C. C., Calculation of loss of vision.. 374
Koch, C. C., Continuing an optometric practice 453
Koch, C. C., Glass..... 167
Koch, C. C., Massage and the correction of ocular symptoms 82
Koch, C. C., Ophthalmoscopy under natural illumination 371
Koch, C. C., Optometric educational Standards improving 40
Koch, C. C., Optometric investment in equipment 402
Koch, C. C., Phychotherapy and pain..... 123
Koch, C. C., Refraction routines..... 372
Koch, C. C., Research, so-called..... 372
Koch, C. C., Some first experiences with Optometrists 250
Koch, C. C., The application of heat in orthoptic treatment work..... 125
Koch, C. C., The optometric Physical Therapist 208
Koch, C. C., The Rontgen or X-Rays..... 83
Koch, C. C., Unusual uses for bifocals.... 370
Koch, C. C., Visual Field Studies..... 38
Kollmorgen, E. O..... 238
Kollmorgen, F. L. G..... 238
Kotvis, H. L..... 175
Kraskin, Lewis H.....62, 91, 102, 144
Kraskin, L. H., A study into the factors entering into the determination of Handedness 62, 91, 144
kratoculator (also see orthoptic treatment)
kratometer (see adduction, abduction and orthoptic treatment).3, 156, 227, 236, 237, 392
Krause, W. 269, 272
Kulpe 143
Kurtz, J. I.....125, 210, 286, 293, 334, 335, 376, 390, 416, 417, 426, 427, 449, 487

Kurtz, J. I., Abnormal psychology and its clinical application 427
Kurtz, J. I., Health service in Soviet Russia 481
Kurtz, J. I., The development of myopia.. 332
Kurtz, J. I., The mechanism of accommodation 285
Kurtz, J. I., The treatment of squint cases 390

L

laboratory examination, Medical (see also blood analysis) 75
lachrimation (see also lachrymal apparatus and symptoms) 471
lachrymal apparatus (see also tears, lachrymal ducts, lachrymal sac, lachrymal glands) 304
lachrymal bone (see also orbits)
lachrymal ducts (see also lachrymal apparatus, lachrymal sacs, lachrymal glands and tears)
lachromal fluids (see also tears, lachrymal sac and lachrymal apparatus)..363, 364, 365
lachrymal glands (see also lachrymal ducts, lachrymal sacs, tears and lachrymal apparatus)
lachrymal sacs (see also lachrymal ducts, tears, lachrymal glands and lachrymal apparatus) 304
Lag in dynamic retinoscopy, L. A. Swann. 465
lag of accommodation (see also dynamic skiametry and accommodation).....59, 382, 386, 465, 466, 467
LaGrange, Fred C..... 209
lamina cribosa (see also fundus and retina)
Landolt.....270, 272, 286, 444
Lang, W. 30, 36
Langley 258
lashes, eye (see also lids, eye)..... 304
latent hyperopia (see also hyperopia).... 467
Lauer, Alvhh R.....85, 86, 174, 175
Lauer, A. R., A portable research clinic.. 85
Laurance, Lionel.....39, 271, 276, 284, 369
Laurent 268
Lawrence, Slade 319
Lawson, H. W.....64, 92
Lebinson, J. E..... 375
Lehmann-Nitsche, R. 68
lenticular astigmatism (see also astigmatism and crystaline lens).....2, 270
lenticular opacities (see also cataract, ophthalmoscope and crystaline lens)... 310
Lesser, S. K..... 60
levator palpebrarum muscle (see also lids, eye)
Levinsohn 333
Levy, J. M.....31, 36
Lewis, E. F.....48, 50
Lewis, F. Parks.....31, 36, 364, 365, 422, 426
Lewis, James J.....272, 276, 284
lids, eye (see also lashes, ectropion and entropion).....13, 30, 31, 76, 77, 83, 121, 125, 253, 255, 256, 257, 304, 318
light stimulation in the treatment of amblyopia (see also amblyopic flasher, retinal stimulation and orthoptic treatment) 228, 324, 474
lighting (see also hygienic illumination, glare and illumination).....43, 44, 45, 46, 47, 48, 49, 50
Lindsay, B. 149
Listing 461
Listings law (see also torsions, extra-ocular muscles and cyclophoria)....18, 461
liver (see also physical examination)..76, 419
Lockwood 3
locomotor ataxia (see also syphilis, argyll-robertson pupil and physical examination) 253
London Refraction Hospital..... 301, 305, 312, 317, 318
London Refraction Hospital, refractive work at, D. W. A. Mitchell..... 301
Los Angeles City Schools, Department of Research 169
Los Angeles School of Optometry.....40, 41
loupe (see also binocular loupe and external ocular examination).....121, 122
Lowell, W. H.....33, 36
Luckiesh, M.....43, 44, 45, 47, 48, 50, 51
lymph stream (also see blood vessels)..29, 30
Lythgoe, R. J..... 51

Mc

McDougall, W.....69, 433, 446, 449

M

MacCullum.....365, 422, 425, 426
MacElree, George A.....266, 272, 273, 274, 275, 279, 281
MacElree, G. A., Corneal Astigmia..... 266
macular area (see also fundus, retina and ophthalmoscope).....18, 199, 228, 229, 254, 307, 308
Maddox 25
maddox double prism (see also phoria test)
maddox rod (see also phoria tests, convergence and extra-ocular muscles).... 24, 87, 88, 313
Madigan, Leo F.....259, 264, 265
magnetism, healing 427
Magoun, H. W.....253, 255, 256, 258
malingering 434
Mandell, S. R..... 150
Marinasse, A. 31, 36
Mason, F. L..... 171
Massachusetts General Hospital..... 264
massage (see also mechanotherapy and physical therapy) 82, 83, 208
Massage and the correction of Ocular symptoms, C. C. Koch..... 82
Mathias, R. J..... 150
May 472
Mayer, Donald J.....211, 214, 216, 221
Mayer, D. J., Chromography..... 211
Mayer, Leo L.....239, 240, 241, 249
Mayo Clinic and Foundation....30, 32, 35, 52
mechanotherapy (see also physical therapy, massage and symptoms)..... 82
meibomian glands (see also lids)..... 117
Meiser, V. G.....29, 32, 36
Melvin, O. J..... 238
Mendelssohn, W. 125
Mesmer 427
mesmerism 427
metabolism test (see also physical examinations)
metallotherapy 428
miscroscopic spectacle (see also sub-normal vision and telescopic spectacle).243, 244
migraine (see also headaches and symptoms).....1, 2, 31, 336, 337, 338, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350 357, 358, 359, 360
Migraine and Refraction, A. E. Turville.. 336
Milbank Memorial Fund..... 482
Minnesota Academy of Optometry.....11, 43, 74, 377, 408, 427, 459
Minor, L. 150
Minor, Ralph S..... 171
miotics (see also eserine)..... 319
Mitchell, D. W. A.....301, 320
Mitchell, D. W. A., Refractive work at the London Refraction Hospital..... 301
Mitchell, Weir 445
Modern Mechanix 85
monolateral squint (see also squint, strabismus, extra-ocular muscles and orthoptic treatment) 303, 400, 474
Moore, R. Foster..... 343
Morgan, George A.....29, 222
Morgan, G. A., The value of Dental examination in ocular disorders..... 29
Morris, Clarence W.....287, 289
Morris, C. W., Optometric Introspection.. 287
Morrow, John F.....266, 272, 273, 275, 279, 281
Morrow, J. F., Corneal Astigmia..... 266
Morton, W. T. G. 264
Moss, F. A.....64, 92
Moss, F. K.....43, 44, 45, 47, 48, 50, 51
mouth (see also teeth).....29, 30, 32, 33, 35, 212, 215, 220
Munro, L. 150
muscae volitantes (see also symptoms)... 220
mydriatics (see also homatropine-hydrobromide and euphthalmine)....318, 319, 363
myologic unit (also see orthoptic treatment)
myopia (see also near-sight, subjective tests, skiametry static and skiametry dynamic)....2, 13, 15, 16, 17, 26, 74, 75, 80, 81, 82, 117, 118, 119, 126, 128, 129, 132, 140, 141, 162, 171, 172, 296, 311, 317, 332, 333, 334, 344, 346, 466
Myopia, the development of, J. I. Kurtz... 332
myopic atrophies, treatment for (see also telescopic spectacles and sub-normal vision) 240

N

National Research Council 85
National Safety Council 85
National Safety News 85, 86
nausea (see also dizziness, headaches and symptoms) 74, 75, 338, 422, 430
Neale, Arthur R. 158
near-sight (see myopia)
Needles, W. B. 60
Negative fusional convergence, H. S. Horton 155
Negative fusional convergence, W. J. Tait 234
nephritis (see also kidney, auto-intoxication and physical examination) 75, 76, 78, 419
Neptune 68
nerve-force (see also neurology and tonicity)
Neumueller, Julius F. .12, 14, 15, 16, 17, 267, 284
neurasthenia (see also nerve-force, neurology and tonicity) ... 118, 441, 442, 443, 469
neurology (see also nerve-force and tonicity)
neuropathic squint (see also squint, extra-ocular muscles, strabismus and orthoptic treatment)
neurosis (see also nerve-force and neurasthenia) 441, 477
Newsholme, Sir Arthur 482, 483
New York Optometric Year Book 367, 368
Nickel, A. C. 29, 32, 36
night-blindness (see also symptoms) 74
nose (see also symptoms) 33, 469
Nott, I. S. 60
nystagmus (see also symptoms) 210, 399

O

Oakland City Schools 171
Oates, D. W. 150
Oatman 425, 426
oblique muscles (see also extra-ocular muscles) 11, 18, 19, 20, 21, 25, 27, 459, 460, 461, 462, 463, 464
Oblique muscles in ocular rotation and astigmatism, G. L. DuPlessis 459
Obrig, Theo. E. 375, 376
occasional squint (see also squint, strabismus, extra-ocular muscles and orthoptic treatment)
occlusion, the use of (also see orthoptic treatment)
Ocular defects, the importance of the correction of in a remedial reading program, Brant Clark 169
Ocular Disorders, the value of a dental examination in, G. A. Morgan 29
ocular hygiene 126
Ocular images, measurements in the size and shape, L. L. Beacher 259
ocular images, the size and shape of (see also size and shape of retinal images and aniseikonia) 259
ocular psychalgia (see also headache, asthenopia and symptoms) 124
ocular refraction (see also skiametry, subjective tests and refraction) 11, 52, 56, 57, 58, 59, 127, 135, 224, 250, 289, 301, 377
oculist (see also ophthalmologist and eye specialist) 79, 214, 238, 240, 257, 468
oculomotor nerve (see also third nerve) 315, 459
oculomotor nuclei (see also visual centers of the brain, optic nerve and brain) 253, 254, 297
Ogle, Kenneth N. 259, 264, 265
Ohio State University 288
Ohio State University Press 86
Ojeman, R. H. 72, 150, 151
Onman, W. S. 151
ophthalmic surgeons (see also oculist) .. 316
ophthalmoeiknometer (see also size and shape of retinal images) 376
ophthalmologist (see also oculist and eye specialist) 30, 31, 34, 328, 329
ophthalmometer (see also keratometer, astigmatism and cornea) 11, 12, 13, 14, 15, 16, 17, 18, 56, 139, 266, 372, 377, 381, 403, 471, 476
ophthalmoscope (see also retina, fundus cataract and crystaline lens) 56, 76, 232, 303, 305, 306, 335, 371, 372, 377, 381, 403, 468, 470
Ophthalmoscopy under natural illumination, C. C. Koch 371
optic atrophy (see also ophthalmoscope, retina, fundus and focal infection) 30, 216, 240, 308
optic axis 39, 459
optic chiasma (see also oculomotor nuclei and visual centers of the brain) 254
optic disc (see also retina, fundus and ophthalmoscope) 307, 468, 470
optic nerve (see also retina, fundus, brain, oculomotor nuclei and visual centers of the brain) 30, 316, 253, 254, 333
optic neuritis (see also ophthalmoscope, retina and fundus) 31
optic tract (see also optic chiasma and brain) 253, 254, 255, 344, 377
Optical Journal and Review of Optometry 86
optician (see also glass) 239, 240, 241, 316
Optometric Educational Standards, improving, C. C. Koch 40
Optometric Extension, suggestions for adequate, J. O. Baxter, Jr. 404
Optometric Introspection, C. W. Morris ... 287
Optometric investment in equipment, C. C. Koch 402
optometric physical therapist (also see physical therapy and optometrist) .. 208, 209
Optometric Physical Therapist, C. C. Koch 208
Optometric practice, continuing an, C. C. Koch 453
Optometric Research Group of Cleveland. 368
optometrist (see also eye specialist, and refractionist) 1, 5, 29, 34, 40, 80, 82, 83, 121, 123, 124, 125, 159, 207, 208, 209, 211, 216, 219, 223, 224, 225, 250, 251, 252, 253, 257, 285, 287, 288, 289, 290, 291, 371, 379, 380, 381, 390, 392, 393, 394, 397, 402, 403, 404, 405, 406, 407, 409, 410, 453, 454, 455, 456, 457, 465, 466, 468, 469, 471, 472
Optometrists, some first experiences with, C. C. Koch 250
oral infection (see also dentist, focal infection, X-ray, teeth and blood analysis) 218, 222
oral surgeon (see also dentist) 213, 216
orbits (see also bone) 19, 30, 377, 419
orthophoria (see also phoria tests, convergence and extra-ocular muscles) ... 55, 56, 119, 182, 186, 315, 321, 322, 323, 326, 350, 382, 383, 397, 462
Orthoptic training, an illuminating unit for, J. E. Asarkoff and M. Shnitzler 450
orthoptic treatment (see also treatment of squint, squint and extra-ocular muscles) 24, 52, 53, 55, 59, 78, 83, 125, 126, 156, 157, 158, 159, 160, 164, 220, 221, 222, 223, 224, 225, 227, 230, 232, 233, 235, 236, 251, 264, 316, 318, 321, 322, 323, 324, 325, 326, 328, 329, 330, 331, 335, 369, 390, 391, 394, 399, 400, 401, 405, 439, 450, 451, 458, 466, 467, 471, 473, 474, 475, 476, 477, 478, 479
Orthoptic treatment work, the application of heat in, C. C. Koch 125
Orthoptics, a basic technique in, W. Smith 224, 321, 394, 473
orthoptist (see also optometrist and orthoptic treatment) 224, 228, 230, 232, 233, 331, 401, 473, 479, 480
Osmotic phenomena in relation to glaucoma, J. O. Baxter, Jr. 362
osteopath (see also massage) 78, 216
otolaryngologist (see also throat and ear and nose) 30, 34
Owre, Alferd 483

P

Pain (see also asthenopia, migraine and headache) 82, 123, 124, 476, 479
Pain, psychotherapy and, C. C. Koch 123
palilladeoma (see also fundus)
palpation (see also external ocular inspection, glaucoma and intra-ocular tension) 304
Parinand 444
Parsons test for ocular dominance 87
Pascal, J. I. 61
Pearson, Karl 296, 300
Pease, M. C. 31, 36
Pech 131, 143
Peckham, R. M. 61
Pennsylvania State College 405
Pennsylvania State College of Optometry 181, 267, 268, 282, 365, 404, 408

perimeter (see also visual field charting, color field charting and campimetry)... 38, 39, 232, 309, 372, 391, 403, 471
perimetry (see also campimetry, color field charting and visual field charting) 38, 232, 309, 310, 471
periodic squint (see also squint, extra-ocular muscles, strabismus and orthoptic treatment)
Perlia 255
Peter, L. C. 61
Peterson, G. M. 150
Pfeffer 362
pharynx (see also throat) 30
philosophy 367
phoria tests (see also convergence, blur point tests and accommodation) 9, 56, 57, 87, 88, 159, 163, 171, 181, 182, 183, 184, 185, 186, 187, 215, 225, 226, 230, 235, 236, 264, 289, 313, 347, 350, 360, 369, 381, 382, 383, 384, 385, 386, 387, 388, 389, 462
phorometer (see also phoria tests, adduction, abduction and orthoptic treatment) 9, 87, 88, 227, 232, 322, 450
phoroptor (see also phorometer and phoria test and duction test and orthoptic treatment) 24, 87, 139, 141, 181, 227, 392, 403, 466
photophobia (see also symptoms and glare) 31, 76, 77, 220, 442, 471
physical examination (see also physician, focal infections, auto-intoxication and consultations) 75, 77, 78, 419
Physical Therapist, the optometric, C. C. Koch 208
physical therapy (see also massage, high-frequency, diatheramy and ultra-violet and infra red radiations) 82, 83, 208, 209, 364, 422, 423, 424, 425
physician (see also physical examination) 29, 30, 34, 77, 78, 239, 258, 392, 416, 420
Physico-Medical Society of Wurzburg 84
physiological cup (see also macular area, fundus, retina and ophthalmoscope) 308
physiological exophoria (also see exophoria) 316, 465, 466
physiological optics 487
physiology 367, 405, 406, 427, 438, 476
Piersol 365, 425
Pillsbury, W. H. 270, 272, 276, 284
pin hole disc (see also visual acuity and sub-normal vision) 197, 205, 395, 473
pin hole spectacle (see also sub-normal vision) 243, 244, 245
Popular Science 85
Popular Science Monthly 85
positive fusional convergence reserve (also see abduction) 439
Posner, C. A. 371
Post-Graduate Eye Institute Monthly Report 125
Practice building, modern methods of, G. C. Jenson 408
presbyopia (see also accommodation, ciliary muscle and fusion) 5, 11, 49, 118, 119, 301, 335, 367, 370, 371, 372, 382, 387, 465, 466, 467, 468, 470
Preston 365
prismatic corrections, the prescribing of (see also exophoria, esophoria, hyperphoria, squint and orthoptic treatment) 2, 52, 53, 54, 55, 59, 126, 159, 230, 231, 315, 330, 348, 360, 361, 459
prisms, displacing test (see also phoria test, phorometer and convergence) ... 9, 23, 155, 156, 181, 182, 234, 235, 313, 380, 381, 382, 383, 386
prisms, use in treatment work (see also kratometer, rotary prism and orthoptic treatment) 155, 156, 157, 158, 159, 160, 161, 162, 163, 181, 227, 230, 322, 348, 349, 400, 466
project-o-chart (A. O. Co.) (see also test chart) 135, 393
prostate 29, 32
pseudo-squint (see also squint, extra-ocular muscles, strabismus, and orthoptic treatments)
psychic squint (see also squint, extra-ocular muscles, strabismus and orthoptic treatment)
psychoanalysis 428, 432
psychology (see also psychotherapy) 124, 367, 372, 373, 405, 409, 416, 427, 430, 442, 443, 448
Psychology, abnormal, J. I. Kurtz 427
psychotherapy (see also psychology) 123, 124, 427, 428, 433, 434
Psychotherapy and pain, C. C. Koch 123
ptosis of the lids (see also lids) 31
ptosis spectacles (see also lids, and ptosis of the lids)
puncta (see also lachrymal apparatus) ... 304
pupil (see also pupillary reflexes, iris, anterior chamber and external ocular inspection) 39, 129, 134, 141, 196, 253, 254, 255, 256, 257, 258, 305, 306, 311, 317, 319, 374, 422, 469, 470
Pupil, the Argyll-Robertson, F. W. Brock. 253
Puyseguer 427
pyorrhea (see also mouth, focal infection, dental examination and teeth) 32, 33, 35, 212

Q

Quimby, P. P. 427, 428
Quinan, C. 151

R

radiant energy (see also spectrum, visible light and invisible spectrum) 125, 425
radium (see also physiotherapy and invisible spectrum) 84
Ramaley, F. 149
Rand, G. 48, 49, 50
Ransom, S. W. 253, 255, 256, 258
Rasmussen, Andrew Theodore 256, 258
Readers Digest 86
Reading, cautions concerning illumination intensities used for, Miles A. Tinker 43
Reciprocal innervation, the distribution of to the extra-ocular muscles, W. O. Vivian 181
record chart (see also chart) 302, 469, 479
rectum 29
red free glass, the use of (see also cataract) 188, 189, 190, 191, 192, 193, 194
Red-free glass, the use of in certain cataract cases, E. E. Hotaling and E. LeRoy Ryer 188
red filters, the opthalmic use of (see also orthoptic treatment and squint)
refraction (see also ocular refraction and subjective tests) 1, 12, 41, 52, 80, 117, 234, 301, 316, 317, 336, 371, 372, 377, 462
Refraction, an improved technique for the subjective measurement of, J. R. Cohen 127
Refraction and migraine, A. E. Turville.. 336
Refraction of Astigmatic cases at the bedside, C. C. Koch 41
Refraction routines, C. C. Koch 372
refractionist (see also optometrist) ... 12, 60, 63, 136, 141, 182, 377, 378, 380, 381, 463
Refractionist, The 301
Refractive work at the London Refraction Hospital, D. W. A. Mitchell 301
Refractive routine, the 18 point, L. L. De Mars 377
refractor (see also phoria tests and orthoptic treatment) 227, 392
Regnault, F. 150, 151
Research clinic, a portable, A. R. Lauer.. 85
Research, so-called, C. C. Koch 372
retina (see also fundus, macular area, optic disc and ophthalmoscope) 8, 18 21, 30, 56, 87, 129, 136, 153, 196, 205, 228, 229, 240, 253, 254, 256, 260, 297, 307, 308, 347, 371, 378, 395, 460, 479
retinal fatigue (see also photophobia and symptoms)
retinal light stimulator (see also orthoptic treatment) 395, 396, 397, 398, 399, 400, 401
retinal stimulation (see also (syntonics, amblyopic flasher and orthoptic treatment) 228, 229, 321
retinitis (see also retina, fundus, focal infection and ophthalmoscope) .. 76, 240, 307
retinitis pigmentosa (see also ophthalmoscope, fundus and retina) 240
retinoscope (see also skiascope, shaddow movement, skiametry static, skiametry dynamic, static skiametry, dynamic skiametry and retinoscopy) 11, 12, 15, 56, 139, 196, 199, 306, 310, 311, 317, 318, 335, 382, 383, 384, 386, 399, 403, 466
retinoscopy (see also skiametry static, skiametry dynamic, static skiametry and dynamic skiametry) 11, 15, 17, 18
Retinoscopy, lag in dynamic, L. A. Swann 465
Riley, H. A. 154, 342

Robinson, S. H. 61
Rontgen, W. K. 83, 84
Rontgen Rays, C. C. Koch 83
Rosenow, E. C. 29, 30, 32, 33, 36, 37
rotary prism (see also phorometer, adduction, abduction and orthoptic treatment) 227, 313, 314, 315, 369
Rothschild, K. 150
rotoscope (also see orthoptic treatment) 156, 157
Rutgers University 203
Ryer, E. LeRoy 12, 13, 188, 238, 266, 276, 282, 283, 284
Ryer, E. LeRoy, Red-free glass in cataract cases 188

S

St. Louis Post Dispatch 85
Salov, H. Leslie 176, 199, 204
Salov, H. L., A case of Keratoconus 176
Saturday Evening Post 48
Savage 18, 24, 25, 26, 27, 464
Schiff, E. 150
Schiotz 268
Schlemm, canal of, (see also viterous and glaucoma) 333, 334
Schmidt, W. A. 172, 175
Schoen, Z. J. 164
Schoen, Z. J., Practice and fatigue effects in visual readjustments 164
schools, optometric (see education, clinics and courses) 40, 41
Schott, A. 150
Schudemann, N. V. 150, 151
Scientific Monthly 85
sclera (see also external ocular inspection, sclerotic coat, scleritis and episcleritis) 205, 304, 332, 333, 334, 420, 421
scleritis (see also sclera, sclerotic coat and episcleritis) 31, 304
sclerotic coat (see also sclera, external ocular inspection, scleritis and episcleritis) 332, 333, 423
Scofield, C. F. 164
scotoma (see also perimetry, campimetry, visual field charting and fundus) 87, 214, 309, 310, 337, 338, 339, 340, 349, 358, 422, 471, 472
second nerve (see also cranial nerve) 377
Seimens, H. W. 151
Selzer, C. A. 170, 171, 172, 175, 300
seventh nerve (see also cranial nerves) 377
shaddow movement (see also skiametry static or skiametry dynamic) 465
Shaker Heights Reading Clinic 173
Sheard, Charles 13, 14, 52, 56, 60, 61, 143, 270, 272, 276, 284, 320
Sheard, Charles, Analysis of data on ocular convergence and accommodation 52
Shepard, Carl 125
Sherrington 159, 235
Shnitzler, Meyer 450, 451
Shnitzler, M., An illuminating unit for orthoptic training 450
side shield for glasses (see also subnormal vision) 205, 245
Sidis, Bornis 435, 436, 437, 438, 449
Silver, Edwin H. 85, 90
Simpson, Russell E. 74
Simpson, R. E., An Ocular diagnosis for intestinal Auto-Intoxication 74
Sinden, R. H. 47, 50
sinus (see also focal infection and transillumination) 30, 31, 33, 212, 215, 218, 219, 220
sixth nerve (see also abduction, and extraocular muscles) 23, 225, 377
size and shape of retinal images (see also aniseikonia) 17, 259, 260, 261, 262, 263, 264, 347
Skeffington, A. M. 61, 212, 405
skiametry, dynamic (also see skiametry static, dynamic skiametry, static skiametry and retinoscopy) 267, 372
skiametry, static (see also skiametry dynamic, static skiametry, dynamic skiametry, shaddow movement and retinoscopy) 42, 171, 267, 321, 326, 372, 476
ski-optometer (see also phoroptor, phorometer and rotary prism) 227
skiascope (see also retinoscope, skiametry and retinoscopy) 277, 372
slit-lamp (see also external ocular inspection, focal illumination and external examination) 177, 178, 305, 306, 335
Small, C. P. 345, 361
Smith, Herbert N. 482
Smith, William 80, 224, 321, 394, 473
Smith, W., A basic technique in orthoptics 224, 321, 394, 473
Smith, W., The Duochrome cross cylinder check test 80
Snell, A. C. 375
Snellen 56, 132, 197, 198, 229, 395
somnambulism 427
South Dakota Optometric Association 482
spasm of accommodation (see also lag of accommodation and accommodation) 75, 468
spectrum (see also invisible spectrum, light, heat, ultra-violet radiations, infra-red radiations, X-rays and physiotherapy) 83, 84
spherical lenses (see also hyperopia, myopia, convex lenses and concave lenses) 24, 42, 75, 81, 118, 138, 141, 142, 153, **196, 204, 205, 321**
spherical telescopic spectacle (see also sub-normal vision and telescopic spectacle) 239, 244
sphincter muscles of the iris (see also iris) 363
spurious squint (see also squint, extraocular muscles, strabismus and orthoptic treatment)
squint (see also strabismus, treatment of squint, orthoptic treatment, and extraocular muscles) 1, 11, 23, 53, 82, 126, 227, 231, 303, 317, 318, 323, 328, 390, 391, 392, 393, 399, 462, 474, 479
squint korrector (see also T. J. Arneson and orthoptic treatment) 156
Squint, the treatment of, J. I. Kurtz 390
Stafne, E. C. 32, 37
staphyloma (see also cornea, sclera and sub-normal vision) 195, 196
Starling, E. H. 154, 365, 469, 472
Starr, Henry E. 203
static retinoscopy (see also static skiametry, retinoscopy, shaddow movement and dynamic skiametry) 56, 59, 197, 382, 383, 384
Stebbins, J. Rowland 366
Stebbins, J. R., The accepted standards of convergence requirements are insupportable 366
Steele 27, 464
Steele rule (see also astigmatism) 27, 464
Steeve, John A. 195
Steiger 13, 14
Stein 239, 240, 241, 249
Steinbugle, W. F. C. 31, 36
Stellwag 304
stenopaic slit (see also sub-normal vision and visual actuity) 197
stereoscope (see also fusion, squint and orthoptic treatment) 152, 153, 174, 231, 232, 324, 392, 398, 445
stereophorometer. (A. O. Co.), see also phorometer and orthoptic treatment) .. 261
stereopsis (see also fusion and orthoptic treatment) 227, 230, 231, 313, 323, 324, 326, 327, 397, 474, 475, 476, 480
stereoscopic treatments (see also fusion training, stereoscope and telebinocular) 53, 59, 210, 313, 330, 399
Stereoscopic vision, a note on, E. Allgaier 152
Sterling, Scott 375
Stern, G. 150
Stevens 18, 23, 24, 459, 460, 464
Stevenson, D. R. 220
Stevenson, Robert Louis 410
stomach (also see physical examination) 216
strabismus (see also squint, treatment of squint, orthoptic treatment and extraocular muscles) 42, 119, 156, 171, 210, 226, 228, 235, 318, 321, 323, 325, 390, 394, 398, 400, 450, 474, 476, 477
Subjective measurement of ocular refraction, an improved technique for, J. R. Cohen 127

subjective tests (see also ocular refraction and refraction)....3, 41, 42, 56, 81, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 197, 204, 224, 310, 311, 312, 317, 326, 359, 360, 372, 382, 383, 384, 386, 388, 466, 467, 476
subnormal vision (see also blindness and amblyopia and orthoptic treatment) 176, 177, 195, 207, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249
Subnormal vision, a report of 500 cases, W. Feinbloom 238
Subnormal vision from infancy, a case report, C. E. Jaeckle..... 195
superior maxillary bone (see also sinus) 19
Suppression lenses (also see orthoptic treatment)
suppression of vision (see also fusion, amblyopia ex anopsia, visual field charting and orthoptic treatments)....226, 232, 313, 315, 324, 330, 347, 390, 391, 397, 398, 473, 474, 475, 476, 477, 479
suspenopsias (see also suspension of vision and orthoptic treatment)..... 399
suspension of vision (see also tonicity, neurology, nerve-force and fusion).. 226, 232, 347, 390, 391, 476
suspensory ligament (see also crystaline lens and zonule of zinn)..... 285
Sutcliff, J. H..... 42
Swann, L. A.....61, 458, 465
Swann, L. A., Lag in dynamic retinoscopy 465
Symonds, C. P.....343, 361
Symptoms, ocular, massage and the correction of, C. C. Koch..... 82
synoptophore (see also orthoptic treatment) 3
syntonic treatments (see also visible light, physical therapy and orthoptic treatment).....218, 220, 222
symptoms (see also case history, fatigue, pain and headache).....53, 74, 76, 82, 83, 118, 289, 302, 309, 314, 336, 337, 343, 346, 360, 372, 380, 441, 470, 471, 472, 474
syphilis (see also argyll-robertson pupil and physical examination).....33, 35, 76, 258, 306, 469

T

Tait, Edwin Forbes.....61, 159, 237
Tait, William J.....155, 156, 157, 159, 162, 234, 236, 369
Tait, W. J., Negative fusional convergence 234
Taylor, A. H.....47, 48, 50
tears (see also lachrymal fluids)
teeth (see dentist, dental examination and focal infection)....29, 30, 31, 32, 33, 34, 35, 62, 78, 212, 214, 217, 220, 221, 307, 311, 469
telebinocular (Keystone) (see also orthoptic treatment).....261, 322, 324, 395, 397, 477, 478
telescopic spectacles (see also sub-normal vision).....197, 198, 199, 200, 201, 203, 204, 205, 206, 238, 239, 240, 241, 243, 375
telescopic trial case (see also telescopic spectacle)
test chart (see also Snellen, visual acuity and astigmatic chart)..42, 56, 127, 132, 138, 139, 140, 142, 182, 315, 320, 329, 393, 394, 403, 465
test-type, near-point (see also subjective tests, accommodation and Jaeger test-type).....3, 4, 77, 287, 395, 465
Texas Optometrist, The..... 370
third nerve (see also convergence, oculomotor nerve and orthoptic treatment) 19, 23, 117, 118, 225, 254, 315, 319, 363, 377, 381, 459
Thorington, James.....270, 276, 284
throat (see also mouth, tongue and pharynx).....33, 212, 215, 218, 220, 469
Tilney, F..... 154
Tinker, Miles A.....43, 44, 51
Tinker, Miles A., Cautions concerning illumination intensites used for reading. 43
tinted lenses (see also absorption glass, photophobia and glare).....77, 375
tobacco and alcohol amblyopia (see also amblyopia and toxemia and toxic amblyopia).....309, 310
tongue (see also mouth)
tonicity (see also ciliary tonicity, nerve force and neurology).....52, 161, 216, 232, 372, 472
tonometer (see also intra-ocular tension and glaucoma) 334
tonsillectomy (see also throat and focal infection) 223
tonsils (see also focal infection, throat and pharynx).....32, 33, 34, 469
Toronto Star 85
torsions (see also Listings Law, extra-ocular muscles and cyclophoria)....11, 17, 18, 20, 21, 24, 27, 28, 459, 460, 461, 462
Torsions, Astigmatism, their effect upon each other, G. L. DuPlessis..... 11
toxemia (see also toxic amblyopia, focal infections, color field charting and amblyopia)....211, 212, 214, 220, 223, 226, 304, 309, 343, 419, 467, 468, 469, 470
toxic amblyopia (see also focal infections, chromagraphology, perimetry, amblyopia and color field charting).....304, 309
toxins (see also chromagraphology, amblyopia, and focal infections)..211, 216, 222, 386, 388
trans-illumination (see also sinus)
transilluminator (see also sinus and focal infection) 212
Traquair 310
trauma (see also symptoms)
treatment of squint (see also orthoptic treatment and squint and extra-ocular muscles)....303, 318, 390, 391, 392, 393, 473
trial case (see also subjective tests).... 266
trial frame (see also subjective refraction and phoroptor).....139, 141, 199, 266
trichiasis (see also lids and lashes)..... 304
trochlear nerve (see also fourth nerve)..19, 297, 459
traumatic squint (see also squint, strabismus, extra-ocular muscles and orthoptic treatment)
true squint (see also strabismus, squint, extra oular muscles and orthoptic treatment)
Tscherning, M...269, 272, 273, 276, 278, 279, 284
tuberculosis (see also physical examination) 35
Turville, A. E.....1, 3, 4, 6, 7, 316, 336
Turville, A. E., Refraction and migraine. 336
Turville, A. E., Visual Equilibrium..... 1
twenty-one point refraction technic (see also eighteen-point refraction technic, refraction and education)....212, 336, 368, 377, 381, 382, 469

U

ulcer, corneal or conjunctival (see also external ocular examination, slit-lamp and sub-normal vision)..... 305
ultra-violet radiations (see also invisible spectrum, spectrum and physiotherapy) 422
unilateral squint (see also squint, extra-ocular muscles, strabismus and orthoptic treatment) 303
University of California, Division of Optometry 171
University of Minnesota.....11, 43, 74, 287
University of North Carolina..... 405
University of Southern California...9, 40, 169
Uptegrove 220
urethra (see also urologist and physical examination).....30, 32
urinalysis (see also physical examination).....76, 78, 308
urologist (see also genito-urinary tract, prostate and urethra).....30, 34
uveal tract (see also uveitis).....30, 32
uveitis (see also focal infection and uveal tract) 32, 33

V

vacuum electrode (see also high-frequency, diathermy and physical therapy)
veins (see also ophthalmoscope, retina, fundus and blood vessels)..79, 304, 307, 308 418, 425, 471
Verel 444
versions (see also extra-ocular muscles) 231, 303, 326, 330, 375, 390, 475
vertigo (see also nausea, dizziness and symptoms) 118
Vics, Irving 238
visible light (see also illumination, spectrum and physiotherapy).....84, 120, 126, 131, 208, 421, 422, 425

Vision, calculation of the loss of, C. C. Koch 374
visual acuity (see also test chart)....87, 88, 127, 141, 170, 171, 375, 379, 390
visual centers of the brain (see also oculomotor nuclei, optic nerve and brain)..226, 253, 254, 377, 378, 379
visual efficiency 89
Visual Equilibrium, A. E. Turville..... 1
visual field charting (see campimetry and perimetry)....38, 88, 240, 302, 309, 335, 340, 375, 397, 445, 471, 472
Visual Field Studies. C. C. Koch..... 38
Visual readjustment, practice and fatigue effects in. Z. J. Schoen..... 164
vitreous (see also ophthalmoscope)..196, 307, 333, 421, 424
vitreous opacities (see also ophthalmoscope and slit lamp)..... 307
Vivian, W. O.....181, 184, 185
Vivian, W. O. The distribution of the tonic reciprocal innervation to the extra-ocular muscles in over two thousand clinical patients..... 181
vomiting (see also nausea, dizziness and symptoms) 343, 422
Von der Hoeve, J..... 286
Von Graefe.....255, 258, 304
Von Rohr 132, 143, 238, 249

W

Walker, R. N..... 61
Warren, John 264
wasserman test (see also physical examination)
Weiland 266
Weiss, A. P.....85, 86
Wells chart (see also orthoptic treatment) 398
West Side Hospital and Dispensary..... 127
Wetmore, R. G..... 151
Weymouth, F. W.....55, 60
Whipple, G. M..... 149
wide angle telescopic spectacle (see also telescopic spectacle and sub-normal vision) 244
Wiggers 369
Wile, I. S.....150, 151
Wilkins, W. H.....34, 37
Wilson, M. O..... 150
Wilson, Sir Daniel.....73, 150
Wirth, John 176
Wolstad, D. M..... 151
Woo, T. L.....296, 300
Woods, Elisabeth L.....169, 171, 175
Woodworth, Robert S..... 143
Worth 390, 392

X

X-rays (see also invisible spectrum, spectrum, teeth, dentists and Rontgen)..34, 35, 77, 83, 84, 212, 214, 215, 216, 220, 221
X-Rays, the Rontgen or. C. C. Koch..... 83

Y

Yoshicka, J. G.....72, 150

Z

Zeiss, C. 375
Zoethout, W. D.....276, 284, 487
zonule of zinn (see also crystaline lens and suspensory ligament).....285, 286

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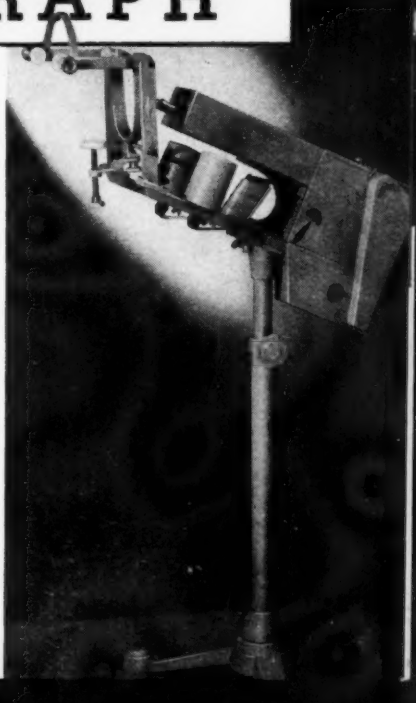

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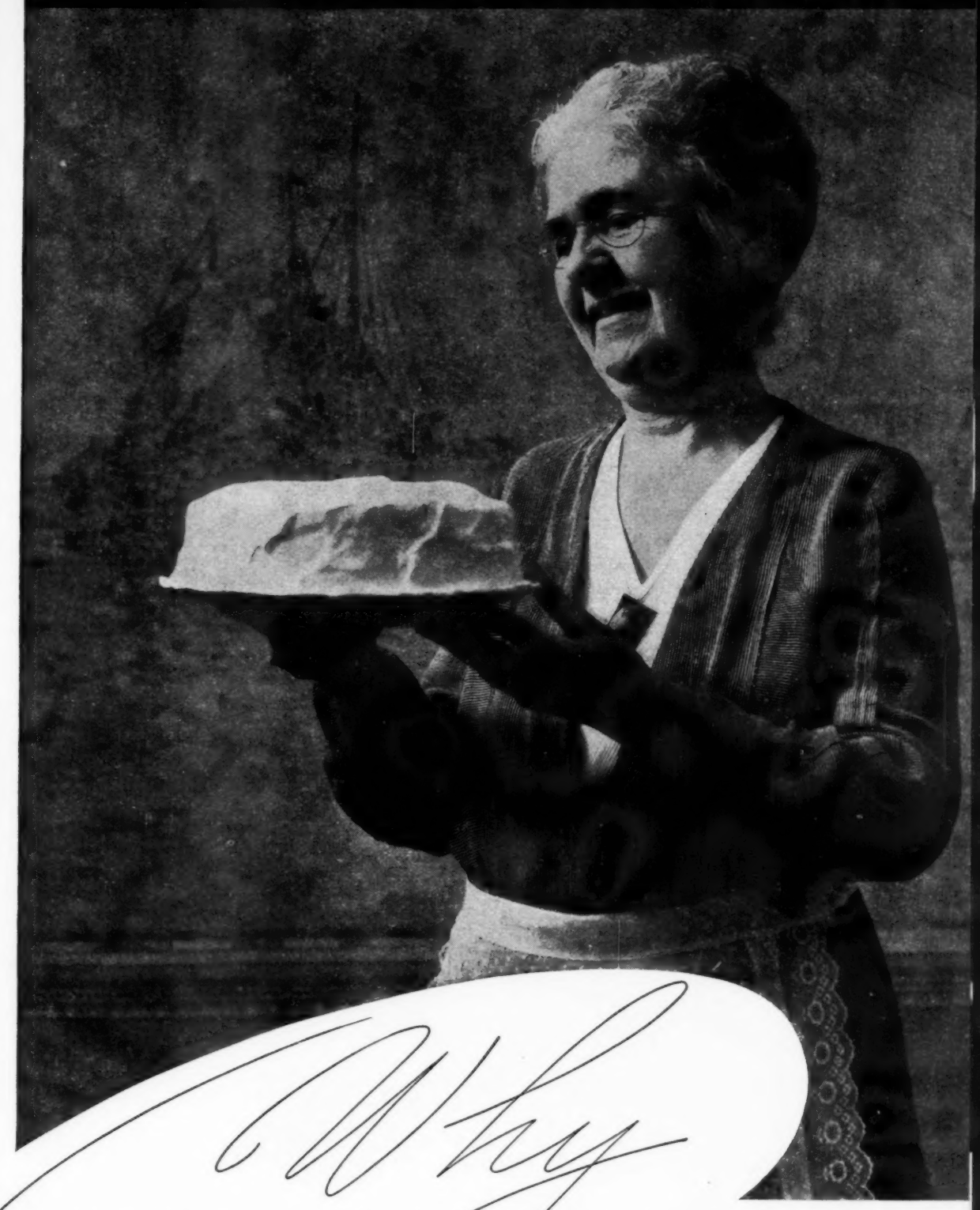

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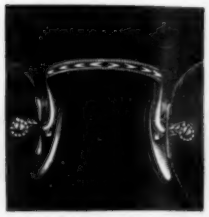
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